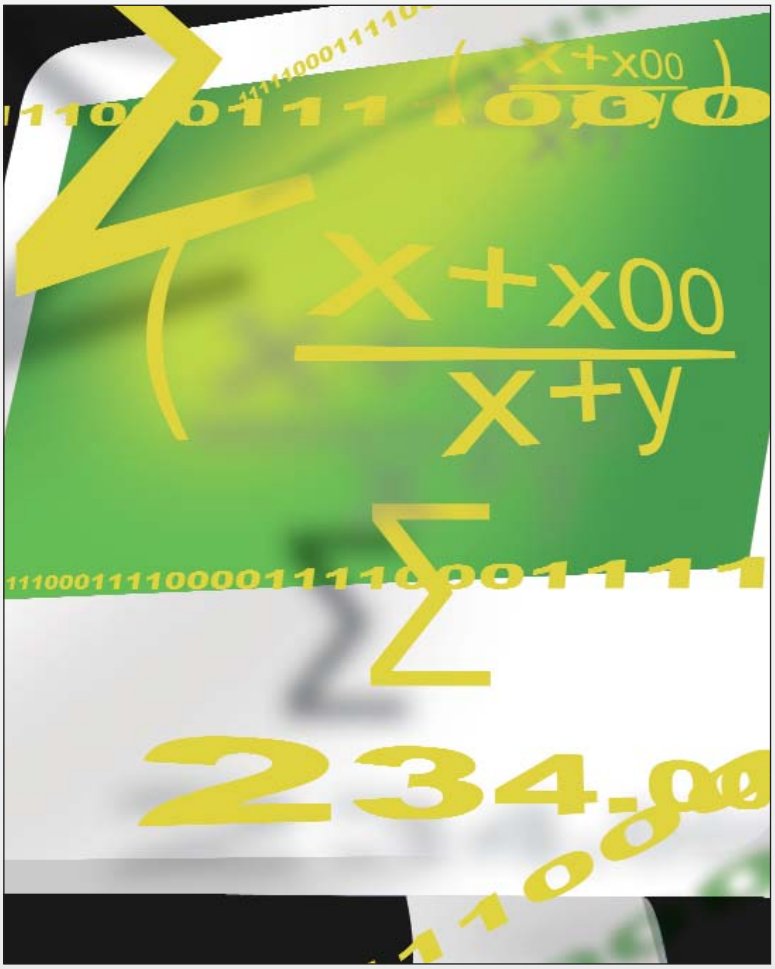
Research *for* Development, Vol. 3

A Bibliography *of* Staff Publications
2002-2005

Faculty *of* Pure and Applied Sciences



Vector Illustration By Chrysalis Communications

Department of Chemistry

992. **Abdur-Rashid, Kamaluddin, Tara P. Dasgupta, Nicholas J. Blundell, John Burgess, and Duncan N. Drasdo.** "Solvation of Inorganic Complexes: Transfer Chemical Potentials for Mono- and Bi-Nuclear Cobalt (III) Complexes to Methanol + Water Mixtures." Transition Metal Chemistry 30 (2005): 176-84.**Refereed**

Solubilities in MeOH-H_2O mixtures at 298.2 K are reported for a number of salts of mono- and bi-nuclear cobalt (III) complexes. From these solubilities and published single ion transfer chemical potentials, on the TPTB (Ph_4P^+ = BPh_{-4}) assumption, transfer chemical potentials have been derived for these mono- and bi-nuclear cobalt (III) complexes. The results and trends are discussed in relation to those for other complexes and ions in these binary aqueous solvent mixtures.

993. **Anderson, Chadwick I., Helen M. Jacobs, and Williams F. Reynolds**. "Indole Alkaloids From Psychotria Corymbosa." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 33.

994. **Antao, Sytle M., Willem H. Mulder, Ishmael Hassan, Wilson A. Crichton, and John B. Parise.** "Cation Disorder in Dolomite, $CaMg(CO_3)_2$, and Its Influence on the Aragonite + Magnesite ↔ Dolomite Reaction Boundary." American Mineralogist 89.7 (2004): 1142-47.**Refereed**

The structure of dolomite, $CaMg(CO_3)_2$, was determined from 298 to 1466 K at a constant pressure of about 3 GPa using in situ synchrotron X-ray diffraction data to investigate the state of disorder. An order parameter s, defined as 2 x_{ca} -1, varies from s = 1 (where x_{ca} = 1) for a completely ordered dolomite to s = 0 (where x_{ca} = 0.5) for a completely disordered dolomite. On heating, there is no measured change in s until the temperature is high enough to cause exchange of Ca^{2+} and Mg^{2+} cations. Significant disorder began to occur at about 1234 K [s = 0.83(1)] and increases along a smooth pathway to T = 1466 K [s = 0.12(5)]. The R3 ↔ R3c transition in dolomite is described by a modified Bragg-Williams thermodynamic model with the following molar free energy of disorder, $G_d(T, s)=Rt_c[1-s^2 + ½a(s^4-1) - (T/T_c)$ {2 In 2 - (1+s) In(1+s) - (1-s) In(1-s)}]. Using T_c = 1466 K and a = -0.29, this model provides an excellent agreement with experimental data. Moreover, the maximum enthalpy of disorder, $H_d(s=0) = RT_c(1- ½a) \sim 14$ kJ/mol, agrees with published calorimetric data. A thermodynamic description of the aragonite + magnesite ↔ dolomite reaction boundary is also presented and it reproduces the main qualitative features correctly.

995. **Aquart, Danielle V., and Tara P. Dasgupta.** "Dynamics of Interaction of Vitamin C With Some Potent Nitrovasodilators, S-Nitroso-N-Acetyl-D,L-Penicillamine (SNAP) and S-Nitrosocaptopril (SNOCap), in Aqueous Solution." Biophysical Chemistry 107 (2004): 117-31.**Refereed**

The reductive decomposition of both SNAP and SNOCap by ascorbate in aqueous solution (in the presence of EDTA) was thoroughly investigated. Nitric oxide (NO) release from the reaction occurs in an ascorbate concentration and pH dependent manner. Rates and hence NO release increased drastically with increasing pH, signifying that the most highly ionized form of ascorbate is the more reactive species. The experiments were monitored spectrophotometrically, and second-order rate constants calculated at 37 °C for the reduction of SNAP are

k_b=9.81 ±1.39x10^{-3} M^{-1} s^{-1} and k_c=662±38 M^{-1} s^{-1} and for SNOCap are k_b=2.57±1.29x10^{-2} M^{-1} s^{-1} and k_c=49.7±1.3 M^{-1} s^{-1}. k_b and k_c are the second-order rate constants via the ascorbate monoanion (HA^-) and dianion (A^{2-}) pathways, respectively. Activation parameters were also calculated and are $\Delta H^{\ddagger}_b$=93±7 kJ mol^{-1}, $\Delta S^{\ddagger}_b$=15±2 J K^{-1} mol^{-1} and $\Delta H^{\ddagger}_c$=51±5 kJ mol^{-1}, $\Delta S^{\ddagger}_c$= -28±3 J K^{-1} mol^{-1} with respect to the reactions involving SNAP. Those for the reaction between SNOCap and ascorbate were calculated to be $\Delta H^{\ddagger}_b$=63±11 kJ mol^{-1}, $\Delta S^{\ddagger}_b$= -71±20 J K^{-1} mol^{-1} and $\Delta H^{\ddagger}_c$=103±7 kJ mol^{-1}, $\Delta S^{\ddagger}_c$=118±8 J K^{-1} mol^{-1}. The effect of Cu^{2+}/Cu^+ ions on the reductive decompositions of these S-nitrosothiols was also investigated in absence of EDTA. SNOCap exhibits relatively high stability at near physiological conditions (37 °C and pH 7.55) even in the presence of micromolar concentrations of Cu^+, with decomposition rate constant being 0.011 M^{-1} s^{-1} in comparison to SNAP which is known to be more susceptible to catalytic decomposition by Cu^+ (second-order rate constant of 20 M^{-1} s^{-1} at pH 7.4 and 25 °C). It was also observed that the reductive decomposition of SNAP is not catalyzed by alkali metal ions. However, there was an increase in rate as the ionic strength increases from 0.2 to 0.5 mol dm^{-3} NaCl.

996. **—-.** "The Reaction of S-Nitroso-N-Acetyl-D, L-Penicillamine (SNAP) With the Angiotensin Converting Enzyme Inhibitor, Captopril—Mechanism of Transnitrosation." Organic Biomolecular Chemistry 3.9 (2005): 1640-46.**Refereed**

Kinetic studies involving the use of both stopped-flow and diode array spectrophotometers, show that the reaction between SNAP and captopril in the presence of the metal ion sequestering agent, EDTA, occurs in two well-defined stages. The first stage is a fast reaction while the second stage is slow. The first stage has been postulated to be transnitrosation, and the second stage involves the decay of the newly formed RSNO to effect nitric oxide (NO) release. Both stages are found to be dependent on captopril and H^+ concentration. The rates of the transnitrosation increased drastically with increasing pH in the first stage, signifying that the deprotonated form of captopril is the more reactive species. In the case of the second stage the variation in pH showed an increase in rate up to pH 8 after which the rate remained unchanged. Both stages were clearly distinguishable and easily monitored separately. Transnitrosation is a reversible reaction with the tendency for the equilibrium to break down at high thiol concentration. Second-order rate constants were calculated based on the following derived expressions: $-d[SNAP]/dt=k_f((K_{SHCapSH}[CapSH]_t)/(K_{SHCapSH^+}[H^+]))[SNAP]$. k_f is the second-order rate constant for the forward reaction of the reversible transnitrosation process. At 37 °C, k_f= 785 ± 14 M^{-1} s^{-1}, activation parameters ΔH_f=49 ±2 kJ mol^1. ΔS_t^+=-32 ± 2 J K^1 mol^1. The activation parameters demonstrate the associative nature of the transnitrosation mechanism. The second stage has been found to be very complex, as a variety of nitrogen products form as predicted before. However, the following expression was derived from the initial kinetic data: rate = $k_1K[SNOCap][Cap\ S]/(K[CapS\ ] + 1)$ to give k_1 = 13.3 ± 0.4 x 10 s and K = 5.59 ± 0.53 ξ 10^1 M^1 ατ 37 °C, where k_t is the first-order rate constant for the decay of the intermediate formed during the reaction between SNOCap and the remaining excess CapSH present at the end of the first stage reaction. Activation parameters are ΔH_t^t=37 ± 1 kJ mol ΔS_t^t = -181 ± 44 J K^1 mol^1.

Aquart, Danielle See also 1018

997. **Bakir, Mohammed A.** "Optical, Electrochemical and Structural Studies on the First Rhenium Compound of Di-2-Pyridylketonephenylhydrazone (Dpkphh), *Fac*-$Re(CO)_3$(Dpkphh)Cl ." Inorganica Chimica Acta 332.1 (2002): 1-6.**Refereed**

fac-$Re(CO)_3$(dpkphh)Cl isolated from the reaction between $Re(CO)_5Cl$ and dpkphh in refluxing toluene exhibits rich physico-chemical properties. Spectroscopic measurements on *fac*-$Re(CO)_3$(dpkphh)Cl revealed strong solvent dependence as manifested by the high sensitivity of its ^1H NMR and electronic absorption spectra to solvent variation. Electrochemical measurements on *fac*-$Re(CO)_3$(dpkphh)Cl in CH_2Cl_2 show irreversible/quasi-reversible redox processes pointing to electrochemical transformation(s) following electronic-transfer(s). Crystals of *fac*-$Re(CO)_3$(dpkphh)Cl·CH_3CN obtained from an acetonitrile solution of *fac*-$Re(CO)_3$(dpkphh)Cl are chiral and structural studies show racemic twins of *fac*-$Re(CO)_3$(dpkphh)Cl.CH_3CN with *fac*-$Re(CO)_3$(dpkphh)Cl molecules in distorted octahedral geometry. The molecules pack shows stacks of well separated strands of *fac*-$Re(CO)_3$(dpkphh)Cl·CH_3CN in double helix formation with a network of hydrogen bonds that include solvent–solute and solute–solute interactions. The interlocked helical structure of *fac*-$Re(CO)_3$(dpkphh)Cl·CH_3CN and weak bond energies of the non-covalent interactions may account for the optical behavior of *fac*-$Re(CO)_3$(dpkphh)Cl·CH_3CN as any slight interaction between this system (*fac*-$Re(CO)_3$(dpkphh)Cl and surrounding solvent molecules) and its surroundings may disrupt the weak solvent–solute and solute–solute interactions.

998. **Bakir, Mohammed A., and O. Brown.** "Molecular Structure and Optosensing Behaviour of Di-2-Pyridyl Ketone Benzoylhydrazone in Nonaqueous Solvents." Journal of Molecular Structure 609.1-3 (2002): 129-36.**Refereed**

Crystals of di-2-pyridyl ketone benzoylhydrazone (dpkbh) obtained from a dimethylsulfoxide (DMSO) solution of dpkbh are in the monoclinic space group, $P2_{1/c}$. Structural analysis reveals anti-parallel, non-planar, one-dimensional tapes of dpkbh with a network of intra- and intermolecular hydrogen bonds. Optical measurements on dpkbh in polar non-aqueous solvents revealed the presence of interlocked low-(α–) and high-(β-) energy intraligand charge-transfer electronic states may be due to dpk π–π^* followed by dpk to benzoyl charge-transfer. The equilibrium distribution of the low-(α-) and high-(β-) energy electronic states is solvent dependent, controlled by the hydrogen bonding capacity of surrounding solvent molecules. The interplay between the a- and β-conformations of dpkbh allowed calculations of their extinction coefficients by forcing the equilibrium to shift to one conformation using chemical stimuli. In *N*,*N*-dimethylformamide (DMF), extinction coefficients of 45,000±2000 and 15,000±2000 M^{-1} cm^{-1} were calculated for the a- and β-conformations of dpkbh at λ_{max}, respectively, when excess acid was added to a DMF solution of dpkbh. The weak bond energies of the hydrogen bonds, the reversibility and the sensitivity of the high- and low-energy electronic states to their surroundings in polar non-aqueous solvents allow for the use of this system as molecular sensor for a variety of stimuli that include metal ions, acids and bases. Metal ions in concentrations $<10^{-7}$ M can be detected and determined using this system (dpkbh and surrounding solvent molecules).

999. **—-.** "X-Ray Crystallographic and Optosensing Studies of Di-2-Pyridyl Ketone P-Nitrophenylhydrazone (Dpknph) in Dimethylsulfoxide (DMSO)." Journal of Molecular Structure 641 (2002): 183-91. **Refereed**

Crystals of di-2-pyridyl ketone *p*-nitrophenylhydrazone (dpknph), obtained from a dmso (dimethylsulfoxide) solution of dpknph, are in the monoclinic space group, $P2_1/n$. Structural analysis reveals non-coplanar pyridine rings and infinite one-dimensional chains of dpknph with a network of classic and non-classic hydrogen bonds. Optical measurements on dpknph in dmso in the presence and absence of $CdCl_2$ and $NaBH_4$ gave extinction coefficients of 91,000±2000 and 35,000±2000 M^{-1} cm^{-1} for the high and low energy electronic states of dpknph at 295 K. Thermo-

optical measurements on dpknph in dmso established the reversible interconversion between the high and low energy electronic states of dpknph and allowed calculations of their thermodynamic activation parameters and gave changes in enthalpy (ΔH^{ϕ}) of -49.05±1.25 kJ mol^{-1}, entropy (ΔS^{ϕ})of +0.16±0.04 kJ mol^{-1} and free energy (ΔG^{ϕ}) of -96.30±2.45 kJ mol^{-1} at 295 K. Manipulation of the equilibrium distribution of the high and low energy electronic states of dpknph allowed for the use of the system as cation–anion and acid–base sensor. Basic anions such as BH_4^- and OH^- favor the low energy electronic state and electron deficient anions such as BF_4^-, metal ions and protons favor the high-energy electronic state. The reversible BH_4^-/BF_4^- and OH^-/H^+ interconversion points to physical interactions between these species and dpknph and the use of dpknph as a spectrophotometric sensor for a variety of physical and chemical stimuli. Metal ions in concentrations as low as 1.00×10^{-7} M can be detected and determined using dpknph in dmso.

1000. **Bakir, Mohammed A., S. A. Clarke, Ishmael Hassan, Lancashire Robert J., and Marvadeen A. Singh-Wilmot.** "Trans-Bis(Glycinato-Kappa N-2,O)Copper(II) 4-Bromophenol Solvate ." Acta Crystallographica Section E-Structure Reports Online 60 .Part 6 (2004): M868-M870 .**Refereed**

The title compound, trans-[Cu(gly)(2)] . 4-BrC6H4OH, (I), crystallized in the non-centrosymmetric orthorhombic space group Pca2(1) when trans-bis(glycinato-N,O)copper(II) and 4-bromophenol were allowed to stand in water for several days. Structural analysis reveals that the 4-bromophenol is not coordinated to the copper and that the glycinato units are trans in N,O-bidentate binding mode. The packing of the molecules shows well defined units of (I), interlocked via a network of secondary covalent and non-covalent bonds, with the Cu atom in a [4 + 2] coordination mode.

1001. **Bakir, Mohammed A., Tara P. Dasgupta , Sujit K. Dutta, Nurziana Ngah, and Bohari M. Yamin.** "Porous Solvent-Free μ_2-Bis(Salicylidene)Propane-1,3-Diaminato-Bis{[Bis-Salicylidene)Propane-1,3-Diaminato]Iron (III)}." Acta Crystallographica E-Structure Reports Online E61.Section E (2005): m1464-m1466. http://journals.iucr.org/e/issues/2005/08/00/issconts.html. **Refereed**

The title compound, $[Fe_2(C_{17}H_{16}N_2O_2)_3]$, was isolated from the reaction between iron(III) perchlorate hydrate and a mixture of 1,3-bis(salicylideneamino)propane and triethylamine in ethanol. Recrystallization from a dichloroethane solution resulted in a porous solvent-free array of molecules. The molecule lies on a special position with twofold symmetry.

1002. **Bakir, Mohammed A., Petrea C. Facey, Ishmael Hassan, Willem H. Mulder, and Roy B. Porter.** "Mikanolide From Jamaican Mikania Micranta." Acta Crystallographica 60.Section C (2004): 0798-800.**Refereed**

Mikanolide [systematic names: 1,10:2,3-diepoxy-6,8-dihy-droxy-11-vinylgermacr-4-ene 12,14-di-γ-lactone and 7,10a-di-methyl-1a, 1b,2a,6a,7,9a,10,10a-octahydro-4H-6,3-metheno-furo[3,2-c]bisoxireno[f,h]oxacycloundecin-4,8(6H)-dione], $C_{15}H_{14}O_6$, derived from a variety of Mikania micrantha growing in Portland, Jamaica, contains a methylcyclodecane ring fused to an unsaturated planar ∝,γ-lactone, an envelope type near-planar vinyl- β,γ-lactone and two epoxide moieties. The crystal packing shows stacks of mikanolide molecules interlocked via a network of non-classical C-H...O hydrogen bonds between the lactone units.

1003. **Bakir, Mohammed A., and Orville Green.** "The Structure of Di-2-Pyridylketone P-Aminobenzoylhydrazone Water Solvate (Dpkabz.H_2O)." Acta Crystallographica C58.0263 (2002).**Refereed**

1004. **Bakir, Mohammed A., and C. Gyles.** "Structural Electrochemical and Optical Properties of Dpkfah." Journal of Molecular Structure 649 (2003): 133**Refereed**

1005. **Bakir, Mohammed A., Gabriel R. Harewood, Alvin A. Holder, Ishmael Hassan, Tara P. Dasgupta, Paul T. Maragh, and Marvadeen A. Singh-Wilmot.** "5-[(4-Methylphenyl)Diazenyl]Salicylaldehyde." Acta Crystallographica E61.Section E (2005): 01611-13.**Refereed**

The title compound, $C_{14}H_{12}N_2O_2$, was isolated from the reaction between 4-methylphenyldiazonium nitrite and salicylaldehyde in sodium hydroxide. Structural analysis revealed a nearly planar molecule with the aromatic rings in trans positions about the azo group. The molecule packing shows interdigitated stacks of 12-membered hydrogen-bonded dimers.

1006. **Bakir, Mohammed A., Ishmael Hassan, and Orville Green.** "Manganese Carbonyl Compounds of N, N-Bidentate Di-2-Pyridylketone (Dpk) and N,O,N-Tridentate Hydroxybis (2-Pyridyl) Methanolato (DpkO, OH)." Journal of Molecular Structure 657.1-3 (2003): 75-83. **Refereed**

Electrochemical measurements on *fac*-[$Mn(CO)_3$(dpk)Br] and *fac*-[$Mn(CO)_3$(dpkO,OH)] revealed solvent dependence and rich redox properties and X-ray studies on *fac*-[$Mn(CO)_3$(dpkO,OH)] show distorted octahedral geometry around manganese with the major distortion is due to the binding of hydroxybis(2-pyridyl)methanolato (dpkO,OH) anion and anti-parallel tapes of *fac* -[$Mn(CO)_3$(dpkO,OH)] interlocked via a network of hydrogen bonds. When di-2-pyridyl ketone (dpk) was allowed to react with [$Mn(CO)_5Br$] in dry diethyl ether under ultrasonic conditions *fac*-[$Mn(CO)_3$(dpk)Br] was isolated in good yield and when the same reaction was carried out under reflux conditions in toluene *fac*-[$Mn(CO)_3$(dpkO,OH)] was isolated. Infrared spectra of the isolated compounds confirmed their *fac*-geometry and the presence and absence of the ketonic group of dpk. Electrochemical measurements on *fac*-[$Mn(CO)_3$(dpk)Br] reveal sensitivity to solvents and the presence of reversible and irreversible electronic transfers. In contrast to *fac*-[$Re(CO)_3$(dpk)Cl] where noteworthy electrochemical reactions with CO_2 were observed, the electrochemical reactions of CO_2 with *fac*-[$Mn(CO)_3$(dpk)Br] disclosed no significant reaction. However, when *fac*-[$Mn(CO)_3$(dpk)Br] was allowed to electrochemically interact with group I and II metal ions considerable electrochemical changes were noted on the second reduction wave that may point to the possible use of *fac*-[$Mn(CO)_3$(dpk)Br] as an electrochemical sensor for group I and II metal ions. The electrochemical properties of *fac*-[$Mn(CO)_3$(dpkO,OH)] show the presence of closely spaced irreversible oxidations and probable electrochemical oxidation of coordinated dpkO,OH anion to dpk in dmf. Crystals of *fac*-[$Mn(CO)_3$(dpkO,OH)] obtained from dimethyl sulfoxide (dmso) solution of *fac*-[$Mn(CO)_3$(dpkO,OH)] are in the monoclinic C2/c space group. Structural analysis on *fac*-[$Mn(CO)_3$(dpkO,OH)] disclosed distorted octahedral coordination about manganese with the major distortion due to the tridentate coordination of dpkO,OH anion and the packing of molecules show stacks of anti-parallel tapes of *fac*-[$Mn(CO)_3$(dpkO,OH)] interlocked via a network of hydrogen bonds.

1007. **Burke, S. J., Helen M. Jacobs, S. McLean, and Williams F. Reynolds.** "Structural and Spectral Assignment by 2D NMR of a New Prenylated Benzopyrancarboxylic Acid and Structural Reassignment of a Related Compound." Magnetic Resonance in Chemistry 41 (2003): 145-46.**Refereed**

A new prenylated benzopyrancarboxylic acid, 1a (3,4-dihydro-5-hydroxy-2,7-dimenthyl-8-(2-methlyl-2butenyl)-2-(4 methyl-1, 3-pentadienyl) -2H-1-benzopyran-6-carboxylic acid) was isolated from *Peperomia amplexicaulis* and fully characterized *by* 1D and 2D NMR and high-resolution mass spectrometry. In the course of this investigation, the structure of a related compound (minus the carboxylic acid group) which was previously assigned as 2b was corrected to structure 1b.

1008. **Calvente, Juan José, German López-Pérez, Pablo Ramírez, Héctor Fernández, María Alicia Zón, Willem H. Mulder, and Rafael Andreu.** "Experimental Study of the Interplay Between Long-Range Electron Transfer and Redox Probe Permeation at Self-Assembled Monolayers: Evidence for Potential-Induced Ion Gating." Journal of American Chemical Society 127.17 (2005): 6476-86.**Refereed**

Evidence for the competition between long-range electron transfer across self-assembled monolayers (SAMs) and incorporation of the redox probe into the film is reported for the electroreduction of Ru(NH3)(6)3+ at hydroxyl- and carboxylic-acid-terminated SAMs on a mercury electrode, by using electrochemical techniques that operate at distinct time scales. Two limiting voltammetric behaviors are observed, consistent with a diffusions control of the redox process at mercaptophenol-coated electrodes and a kinetically controlled electron transfer reaction in the presence of neutral HS-(CH2)10-COOH and HS-(CH2)(n)-CH2OH (n = 3,5, and 10) SAMs. The monolayer thickness dependence of the standard heterogeneous electron transfer rate constant shows that the electron transfer plane for the reduction of $Ru(NH_3)_6$ at hydroxyl-terminated SAMs is located outside the film | solution interface at short times. However, long time scale experiments provide evidence for the occurrence of potential-induced gating of the absorbed structure in some of the monolayers studied, which takes the form of a chronoamperometric spike. Redox probe permeation is shown to be a kinetically slow process, whose activation strongly depends on redox probe concentration, applied potential, and chemical composition of the intervening medium. The obtained results reveal that self-assembled monolayers made of mercaptobutanol and mercaptophenol preserve their electronic barrier properties up to the reductive desorption potential of a fully grown SAM, whereas those of mercaptohexanol, mercaptoundecanol, and mercaptoundecanoic acid undergo an order/disorder transition below a critical potential, which facilitates the approach of the redox probe toward the electrode surface.

1009. **Campbell, Kayan P., and Anthony M. Greenaway**. "Water Quality of the Great River Watershed." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003.

1010. **Chen, A. R. M., and Paul B. Reese.** "Biotransformation of Terpenes From Stemodia Maritima by Aspergillus Niger ATCC 9142." Phytochemistry 59.1 (2002): 57-62.**Refereed**

Incubation of stemodin (1) in cultures of Aspergillus niger ATCC 9142 resulted in the production of 2alpha,3beta 13,18-trihydroxystemodane (2), 2alpha,7beta,13-trihydroxystemodane (3) and 2alpha,13,16beta-trihydroxystemodane (4), while stemodinone (5) afforded 13,18-dihydroxystemodan-2-one (6) and 13,16beta-dihydroxystemodan-2-one (7). Four novel metabolites were obtained from the bioconversion of stemarin (8) by the fungus, namely 18-hydroxystemaran-19-oic acid (9), 7beta,18-dihydroxystemaran-19-oic acid (10), 7alpha,18.19-trihydroxystemarane (11) and 1beta-hydroxystemaran-19-oic acid (12). 19-N,N-Dimethylcarbamoxy-13-hydroxystemarane (13) was also transformed to afford 19-N,N-dimethylcarbamoxy-13,17,18-trihydroxystemarane (14).

1011. **Christian, O. E., Helen M. Jacobs, Williams F. Reynolds, R. B. Grossman, and S. Parkin**. "New Prenylated Benzophenones From *Hypericum Hypericoides*." Meeting of the American Society of Pharmacognosy: (Chapel Hill, North Carolina: 2003).

1012. **Collins, D. O., and Paul B. Reese.** "Biotransformation of Cadina-4,10(15)-Dien-3-One and 3 Alpha-Hydroxycadina-4,10(15)-Diene by Curvularia Lunata ATCC 12017." Phytochemistry 59.5 (2002): 489-92.**Refereed**

Cadina-4,10(15)-dien-3-one (1) was metabolised by Curvularia lunata ATCC 12017 in two different growth media to give three metabolites, one of which, 12-hydroxycadina-4,10(15)-dien-3-one (4), was new. Incubation of 3a-hydroxycadina-4,10(15)-diene (2) with the fungus produced three new analogues, namely, (4S)-1alpha,3alpha-dihydroxycadin-10(15)-ene (5), 3alpha,14-dihydroxycadina-4,10(15)diene (6) and 3alpha, 12-dihydroxycadina-4,10(15)-diene (7).

1013. **Collins, D. O., Williams F. Reynolds, and Paul B. Reese.** "Aromadendrane Transformations by Curvularia Lunata ATCC 12017 ." Phytochemistry 60.5 (2002): 475-81.

Refereed

The naturally occurring sesquiterpene squamulosone (1), isolated from Hyptis verticillata (Labiatae), was synthetically reduced to five analogues that were identified as (IS,10S)-9alpha-hydroxy-allo-aromadendrane (2). (1R, 10R)-9beta-hydroxyaromadendrane (3), (1S,10S)-allo-aromadendean-9-one (4), (1R,10R)-aromadendran-9-one (5) and aromadendra-1,9-diene (6). Each congener was incubated with the fungus Curvularia lunata ATCC 12017 in two different growth media. All the substrates except the deoxy compound 6 underwent a simple redox reaction. Ketone 5 additionally experienced remote hydroxylation while analogue 6, possessing a conjugated diene system, was most extensively metabolised. The substrates and products presented here, but one, are all novel.

1014. **—-.** "New Cembranes From Cleome Spinosa ." Journal of Natural Products 67.2 (2004): 179-83.**Refereed**

Examination of the aerial portions of Cleome spinosa yielded five new cembranes, named cleospinols A (1), B (3), C (4), and D (5), and the 3'-hydroxy-iso-pentan-10-oate ester of cleospinol A (2). The cleospinols were determined to be derivatives of 10,13-dihydroxy-4,12-dimethyl-1-(1-methylethenyl)-11(E)-cyclotetradecene on the basis of spectroscopic data interpretation.

1015. **Collins, D. O., P. L. Ruddock, J. C. de Grassea, Williams F. Reynolds, and Paul B. Reese.** "Microbial Transformation of Cadina-4,10(15)-Dien-3-One, Aromadendr-1(10)-En-9-One and Methyl Ursolate by Mucor Plumbeus ATCC 4740." Phytochemistry 59.5 (2002): 479-88.

Refereed

The sesquiterpenes cadina-4,10(15)-dien-3-one (1) and aromadendr-1(10)-en-9-one (squamulosone) (14) along with the triterpenoid methyl ursolate (21) were incubated with the fungus Mucor plumbeus ATCC 4740, Substrates 1, 14 and ursolic acid (20) were isolated from the plant Hyptis verticillata in large quantities. M. plumbeus hydroxylated 1 at C-12 and C-14. When the iron content of the medium was reduced, however, hydroxylation at these positions was also accompanied by epoxidation of the exocyclic double bond. In total nine new oxygenated cadinanes have been obtained. Sesquiterpene 14 was converted to the novel 2alpha,13-dihydroxy derivative along with four other metabolites. Methyl ursolate (21) was transformed to a new compound, methyl 3beta,7beta,21beta-trihydroxyursa-9(11),12-dien-28-oate (22). Two other triterpenoids, 3beta,28-dihydroxyurs-12-ene (uvaol) (23) and 3beta,28-bis(dimethylcarbamoxy)urs-12-ene (24) were not transformed by the micro-organism, however.

1016. **Dasgupta, Tara P.** "Fate of Pesticides in Soil, Water and Sediment." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 62-63.

The author attributes the deterioration of air quality with special focus in the urban area to certain occuring incidence. The investigations on the air quality is aimed at deriving inexpensive and easy-to-operate monitors for the measurements of air pollutants and air pollution levels.

1017. **—-.** "Studies of Some New Nitric Oxide Releasing Compounds: Search for a Second Generation Vasodilator." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 61-62.

1018. **Dasgupta, Tara P., and Danielle V. Aquart.** "Metal-NO Complexes: Structures, Properties and NO-Releasing Mechanisms." Nitric Oxide Donors for Pharmaceutical and Biological Applications. Editors Peng George Wang , Tingwei Bill Cai, and Naoyuki Taniguchi. New York: Wiley, 2005. 109-29.

1019. **Dasgupta, Tara P., Dalip Ragoobirsingh, and Donovan McGrowder.** "The Effects of S-Nitrosoglutathione in Insulin: Receptor Behaviour on Erythrocytes in an Animal Model." Diabetologia Croatica 32.2 (2003): 65.**Refereed**

1020. **Dasgupta, Tara P., and James N. Smith.** "Reactions of S-Nitrosothiols With $_L$-Ascorbic Acid in Aqueous Solution ." Methods in Enzymology 359 (2002): 219-29 .**Refereed**

Dasgupta, Tara P. See also 574, 618, 992, 995, 996, 1001, 1005, 1032, 1046, 1060, 1061, 1064, 1065, 1075

1021. **Dawkins, Tanneika N., and Ishenkumba A. Kahwa**. "Syntheses of Novel Dinuclear Lanthanide(III) Complexes of an Asymmetric Amine-Imine Ligand." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003.

1022. **Donald, Kelling J., Willem H. Mulder , and László V. von Szentpály.** "Success and Failure of Polarized-Ion Models: Bending and Atomization Energy of Groups 2 and 12 Dihalides." Journal of Chemical Physics 119.11 (2003): 5423-36.**Refereed**

Polarized-ion models-with and without dipole reaction fields and charge-quadrupole interaction-are evaluated in calculating atomization energies, bond angles, and bending force constants of groups of 2 and 12 dihalides. A study of the sensitivity to changes in the input parameters reveals a strong dependence on dipole polarizabilities. The change-quadrupole bending terms of a multipole expansion are important for quasi-linear molecules, where the preceding terms in the expansion tend to cancel each other. They normally stabilize the linear geometry, but enhance bent structures, if a certain criterion for the ratio of quadrupole polarizabilities of metal and halide ions is fulfilled. The models explain the bent alkaline earth halides, but fail spectacularly for the group 12 halides-HgBr The charge - quadrupole terms of a multipole expansion are important for quasi-linear molecules, where the preceding terms in the expansion tend to cancel each other. They normally stabilize the linear geometry, but enhance bent structures, if a certain criterion is fulfilled. The models explain the bent alkaline earth halides, but fail spectacularly for the group 12 halides - $HgBr_2$ and HgI_2 are even calculated as unstable relative to the constituent atoms. The unexpected weakness of ionic bonds is related to the large increase of the ionization energies by relativistic effects and the lanthanide contraction.

1023. **—-.** "Valence-State Atoms in Molecules.7.Influence of Polarization and Bond-Charge on Spectroscopic Constants of Diatomic Molecules." Journal of Physical Chemistry A 108.4 (2004): 595-606.

The polarizable valence-state-atoms-in-molecules (pVSAM) model describes the electron-pair bond in A-B molecules by superposing core-polarized A^+B^-, A^-B^+, and A:B structures, whose weights are determined by electronegativity equalization. The polarizable valence state potential energy curve (pVS-PEC) is derived through the systematic improvement of the valence state potential energy curve (VS-PEC) [Gardner, D.O.N.; von Szentpály, L.J. Phys. Chem. A 1999, 103, 9313] and is given as $U(R) = -[(K_1/R) + (K_2/R^4) + (K_3/R^7)] + (T/R) \exp(-\lambda R)$. The first bracketed term contains the Coulomb, charge-induced dipole, and induced dipole-induced dipole terms, derived from weighted ionic and covalent bond-charge contributions. The potential is tested on a broad variety of homonuclear diatoms and heteronuclear halides and hydrided (a total of 52 molecules). The accuracies of the dimensionsless vibration - rotation coupling constant (F) and the anharmonicity constant (G) for the halides of the alkali and coinage metals are significantly better than those of the Morse, Rydberg, simple bond-charge, and Rittner

potentials. Adding core polarization to the VS-PEC reduces the average unsigned errors in the spectroscopic constants of 47 diatomic molecules from 17.1% to 7.5% in F and 18.9% to 7.8% in G, whereas those of the Morse potential amount to 32.6% and 31.4%, respectively.

1024. **Downer, Nadale K., and Yvette A. Jackson.** "Synthesis of Benzothiazoles Via Ipso Substitution of Ortho-Methoxythiobenzamides." Organic & Biomolecular Chemistry 2.20 (2004): 3039-43.**Refereed**

An efficient route to the synthesis of benzothiazoles from ortho- methoxythiobenzamides via the ipso substitution of an aromatic group is presented, and the mechanism of the Jacobson synthesis of benzothiazoles is further investigated

1025. **Ellis, Henry A., Nicole A. White, Ishmael Hassan, and R. Ahmad.** "A Room Temperature Structure for Anhydrous Lead (II) Decanoate." Journal of Molecular Structure 642 (2002): 71-76. **Refereed**

The room temperature structure of anhydrous lead (II) decanoate has been studied using X-ray diffraction, infrared spectroscopy and polarizing light microscopy. A triclinic unit cell with dimensions: a = 8.529 (3), b = 11.207 (4), c = 28.451 (2) Ĺ, a = 83.814 (2), β = 88.971 (2), γ = 65.143 (3); Z = 4, M = 549.2 g mol^{-1}, D_c = 1.50 (6), D_m = 1.68 (2) is indicated. Infrared and powder diffraction data point to a structure containing both bidenate bonding and carboxylate bridging around, possibly eight coordinated lead. A bilayer arrangement of chains at an average 68° to planes containing Pb^{2+} ions is proposed. Each molecule is situated at the corners and center of the unit cell with possibly P1 symmetry as is the case for copper (II) decanoate.

1026. **Ellis, Henry A., Nicole A. White, Richard A. Taylor, and Paul T. Maragh.** "Infrared, X-Ray and Microscopic Studies on the Room Temperature Structure of Anhydrous Lead (II) N-Alkanoates." Journal of Molecular Structure 738 (2005): 205-10.**Refereed**

The room temperature structure of a series of even-chain length lead (II) n-alkanoates have been studied using infrared spectroscopy, X-ray diffraction and polarizing light microscopy. Whilst the bonding is the same for both long and short chain compounds, where four carboxylate groups form an unsymmetrical bidentate bond with a lead atom, with possible carboxylate bridging to adjacent lead atoms, at least for the short chain length compounds, the arrangement of hydrocarbon chains within a lamella is different. Both X-ray and microscopic studies show that for short chain compounds, hydrocarbon chains are arranged as bilayers within a lamella and tilted with respect to the lead basal plane. For the long chain compounds, it is proposed that the chains are arranged as a monolayer within a lamella, in an alternating arrangement, and slightly tilted with respect to the lead basal plane. For all the compounds, X-ray data point to a triclinic unit cell containing four molecules per unit cell with P1 symmetry, and chains oriented along the c axis.

Ellis, Henry A. See also 1079

1027. **Facey, Petrea C., Roy B. Porter, Paul B. Reese, and Lawrence A. D Williams.** "Biological Activity and Chemical Composition of the Essential Oil From Jamaican Hyptis Verticillata Jacq. " Journal of Agricultural and Food Chemistry 53.12 (2005): 4774-77.**Refereed**

The chemical composition of the essential oil obtained by hydrodistillation from the aerial parts of Hyptis verticillata Jacq. was elucidated by a combination of GC and GC-MS analyses. The oil was dominated by the sesquiterpenoids cadina-4,10(15)-dien-3-one (15.1%) (1) and aromadendr-1 (10)en-9-one (squamulosone) (30.7%) (2). The oil exhibited chemosterilant activities against the cattle tick, Boophilus microplus Canest., and toxic action against adult Cylas formicarius elegantulus Summer, the most destructive pest of sweet potato (lpomoea species).

1028. **Facey, Petrea C., Roy B. Porter, Paul B. Reese, and Lawrence A. D Williams.** "Chemical Composition and Biological Activity of the Essential Oil From Jamaican Hyptis Verticillata Jacq." [Abstract]. Abstracts of Papers of the American Chemical Society 228.U61-U61 (2004).

1029. **Fender, N. S., and Ishenkumba A. Kahwa.** "Defects and Luminescence Behavior of Cubic F23 [(NH4(18-Crown-6)(4)MnX4] [TIX4], (X = Cl, Br) Crystals." Journal of Solid State Chemistry 163.1 (2002): 286-93.**Refereed**

Luminescence from [(NH4(18-Crown-6)(4)MnBr4][TIBr4] (2) (1), [(NH4(18-Crown-6))(4)NH4Cl4][TICl4] (2) (2), [(NH4(18-Crown-6))(2)MnBr4] (3), and [(NH4(18-Crown-6))(2)MnCl4] (4) was studied in search of new insights regarding crystal defects in 2. Emission from 3 and 4 is normal Mn2+(T-4(1)((4)G) —> 6A(1); that of 2 (lambda(max) 520 nm at ca. 300 k and 560 nm at 77 K) is unusual and temperature dependent. Thermal barriers (kj/mol, assignment): green emission of 1 and 2, T < 150 K (1-2, NH4+ rotations), 150 < T < 250 K (7-14, energy migration among [MnX4] (2-)), 250 < T < 300 K (26-35, rotations of 18-Crown-6); yellow emission of 2: T <250 K (7-8, energy migration among [MnX4](2-)), T > 250K (29 kj/mol, defect-to-Mn2+(4T(1)(4)G)) back energy transfer). Crystal data for 4: Space group P2(1)/c; Z = 4; a = 20.173(1) aNGSTROM; B = 9.0144(8) Angstrom; b = 9.0144(8) Angstrom; c= 20.821(1) Angstrom; beta = 98.782(5)degrees; V= 3741.9(8) Angstrom(3); R-w = 0.059; R = 0.054.

1030. **Gossell-Williams, Maxine D., Oswald R. Simon, Melville T., and R. Evans.** "An Aqueous Extract From the Bark of Fagara Martinicensis Shows Selective Stimulation of A1-Adrenergic Receptors." [Abstract]. Experimental Biology 2004: Meeting Abstracts (2004).**Refereed**

1031. **Greenaway, Anthony M.** "Nitrogen and Phosphorus Contamination in and Strategies for Monitoring Jamaican Coastal Waters." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 57-59.

Greenaway, Anthony M. See also 1009, 1062, 1076, 1081

1032. **Harewood, Gabriel R., Alvin A. Holder, Ishmael Hassan, and Tara P. Dasgupta**. "Synthesis, Characterisation and Structural Determination of Salicylaldimine-Based Ligands and Some Corresponding Copper(II) Complexes." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 85.

1033. **Harris, L. V., and Ishenkumba A. Kahwa.** "Asbestos: Old Foe in 21st Century Developing Countries ." Science of the Total Environment 307.1-3 (2003): 1-9.**Refereed**

While use of asbestos materials in developed nations has been decreasing because of the harmful health effects of asbestos dust mining, processing and use of the ancient material in developing countries is increasing. The regulatory mechanism for use, handling and disposal of asbestos and associated waste in developing countries are weak and information on asbestos-related diseases is scanty but emerging. We identify lack of epidemiological data on asbestos health effects as a major gap to be bridged in the promotion of occupational and environmental health in developing countries. Without data on local situations, diseases such as asbestosis and mesothelioma remain too obscure to assist the campaign for appropriate regulation of asbestos usage or attracting attention to abominable industrial practices generally.

1034. **Howell, R. C., S. H. Edwards, A. S. Gajadhar-Plummer, Ishenkumba A. Kahwa, G. L. McPherson, J. T. Mague , A. J. P. White, and D. J. Williams.** "Phthalimides: Supramolecular Interactions in Crystals, Hypersensitive Solution H-1-NMR Dynamics and Energy Transfer to Europium(III) and Terbium(III) States." Molecules 8.7 (2003): 565-92.**Refereed**
Detailed crystal structures and H-1-NMR characteristics of some alkylaminephthalimides, including dendritic polyphthalimides, are reported. These investigations were undertaken in order to obtain a better understanding of the relationship between solid-state supramolecular interactions, their persistence in solution and associated dynamics of magnetically hypersensitive phthalimide aromatic AA'BB'-AA'XX' proton NMR resonances. Some alkylamine phthalimides feature folded molecular geometries, which we attribute to n-pi interactions among proximal amine-phthalimide sites; those alkylamine-phthalimides that have no possibility for such interactions feature fully extended phthalimide functionalities. Accordingly, alkylamine phthalimide compounds with folded solid-state geometries feature solvent and temperature dependent hypersensitive AA'BB'-AA'XX' H-1-NMR line profiles, which we attribute to the n-pi interactions. Luminescence of Eu3+(D-5(o)) and Tb3+(D-5(4)) states show well defined metal ion environments in their complexes with dendritic phthalimides, as well as relatively weak phthalimide-lanthanide(III) interactions.

1035. **Jackson, Yvette A., and Karla-Sue C Marriott.** "A Photochemical Route to Dibenzonaphthyrones ." Heterocycles 57.10 (2002): 1897-900.**Refereed**
Irradiation of 2-methyl 3-phenyl 5,6-dimethoxy-1-benzofuran-2,3-dicarboxylate (5) gave 2,3-dimethoxybenzopyrano[4,3-c]benzopyran-5,11-dione (1 b).

1036. **Jackson, Yvette A., and Karla-Sue C. Marriott.** "Synthesis of 2,3-Dimethoxy-7-Methyl-7,12-Dihydro-6H-[1]-Benzofuro-[2,3-c]-[1]-Benzaz-Epin-6,12-Dione." Molecules 7.3 (2002): 353-62.**Refereed**
Treatment of 5,6-dimethoxy-2-(methylphenylcarbamoyl)-benzofuran-3-carboxylic acid with PPA yielded 2,3-dimethoxy-7-methyl-7,12-dihydro-6H-[1]-benzofuro-[2,3-c]-[1]-benzazepin-6,12-dione. The analogous 2-[(5,6-dimethoxybenzo-furan-2-carbonyl)methylamino]benzoic acid was resistant to cyclization, whereas 2-[(6-methoxybenzofuran-2-carbonyl)-amino]benzoic acid underwent cyclization to the corresponding 3,1-benzoxazin-4-one

1037. **Jackson, Yvette A., D. Rajagopal, J. Bendolph, M. Guillory, M. V. Lakshmikantham, J. Yang, and M. P. Cava.** "Thiophene Isosteres of 9,10-Dithioanthraquinone." Organic Letters 5.11 (2003): 1883-85.
The preparation of 1,3,5,7-tetramethyl-4,8-dihydrobenzo[1,2-c:4,5-c']dithiophene-4,8-dione and its conversion to the corresponding mono- and dithione are described.

Jackson, Yvette A. See also 1024, 1040, 1072, 1078

1038. **Jacobs, Helen M.** "Comparative Phytochemistry of *Picramnia and Alvaradoa*, Genera of the Newly Established Family Picramniaceae." Biochemical Systematics and Ecology 31.7 (2003): 773-83.**Refereed**

1039. **—-.** "Natural Products From Selected Species of the Endemic Jamaican Flora." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 60.
Gives a statistical report on the use of plants endemic to Jamaica, used to produce compounds of biological and structural interests.

Jacobs, Helen M. See also 561, 577, 993, 1007, 1011, 1070, 1071

1040. **Jones, Sharon L., Yvette A. Jackson, and Denise Forrest**. Development of Process Parameters for Full Scale Production of Sorghum Syrup.
Experiments were carried out to develop the process parameters for the production of sorghum syrup. A number of parameters including pH, temperature and acid/enzyme inversion were evaluated in order to produce a syrup with the desired market specifications. This resulted in a process flow in which the major unit operations were enzyme inversion of sucrose at 55-60°C, hot clarification and starch elimination at 95°C and pH 7.2

1041. **Kahwa, Ishenkumba A.** "Developing World Science Strategies ." Science 302.5651 (2003): 1677-79.

1042. **Kahwa, Ishenkumba A.** "Hazardous Materials Inside and Outside the Work Place Environment." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 70-73.
The author looks at strategic solutions to the challenges facing Jamaicans in the safe use, handling and disposal of hazardous materials. A special focus is placed on the safe use, handling and disposal of material such as asbestos. The study undertaken determines the extent to which asbestos was in use, handling methods employed by workers and the nature of the health threat posed by asbestos usage in Jamaica.

1043. **—-.** "Novel Concepts in Biomedical Diagnostics and Therapeutics." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 66-70.
The author looks at the properties of rare earths; that is the 17 groups of lanthanides and their radioactive use. Their use in biomedical application is noted as potentially possible via probing and cooperative interactions of the metals. Reports on the findings of the investigations carried out is given.

Kahwa, Ishenkumba A. See also 685, 1021, 1029, 1033, 1034, 1050, 1051, 1066, 1067, 1068, 1073, 1074, 1077

1044. **Lancashire, Robert J.** "JCAMP-DX and Open and Expanding Scientific Data Format." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 91-92.

1045. **—-.** "Scientific Data and Technical Applications Via the WWW." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 43-46.

Lancashire, Robert J. See also 1000, 1252

1046. **Lui, Jane S., Tara P. Dasgupta, and Paul T. Maragh**. "Mechanistic Studies of Reactions of $[Fe_2(CN)_{10}]^{4-}$ With Ferrocyanide Ions in Slightly Acidic Aqueous Solutions." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003.
The title dimer complex in aqueous solution undergoes a rapid one electron transfer reaction with hexacyanoferrate (II) ions followed by a much slower process which involves the decomposition of the dimer complex to form a

monomeric iron (II) species. The monomeric iron (II) species then undergoes a slow complex reaction to produce a blue complex, very similar in nature to Prussian blue. It is proposed that the mechanism of the first electron transfer process is outer sphere and the subsequent process involves both adduct formation followed by electron transfer. The rate of the electron transfer depends on the concentration of alkali metal cations in solution, revealing the possibility of the formation of an ion-triplet before electron transfer. An overall mechanistic scheme for these stages will be discussed in terms of the kinetic results obtained.

1047. **Martin, G. D. A., Williams F. Reynolds, and Paul B. Reese.** "Investigation of the Importance of the C-2 and C-13 Oxygen Functions in the Transformation of Stemodin Analogues by Rhizopus Oryzae ATCC 11145." Phytochemistry 65.15 (2004): 2211-17.**Refereed**

Incubation of 2alpha,13(R)-dihydroxystemodane (3) with Rhizopus oryzae ATCC 11145 gave 2alpha,7beta,13(R)-trihydroxystemodane (11) while biotransformation of 13(R)-hydroxystemodan-2-one (5) yielded 6alpha,13(R)-dihydroxystemodan-2-one (12) and 7beta,13(R)-dihydroxystemodan-2-one (13). Bioconversion of 2beta,13(R)-dihydroxystemodane (7) with Rhizopus afforded 2beta,7,13(R)-trihydroxystemodane (14). The results complement data from our previous work and provide more information about the effect of functional groups of stemodane substrates on the site of hydroxylation.

1048. **—-.** "Investigation of the Importance of the C-2 Oxygen Function in the Transformation of Stemodin Analogues by Rhizopus Oryzae ATCC 11145." Phytochemistry 65.6 (2004): 701-10.**Refereed**

A new stemodinoside, stemodin-a-L-arabinofuranoside (5), was isolated from the plant Stemodia maritima. Incubation of stemodin (2) with Rhizopus oryzae ATCC 11145 gave 2alpha,7beta,13(S)-trihydroxystemodane (17) and 2alpha,3beta,13(S),16alpha-tetrahydroxystemodane (18) whilst stemodinone (8) afforded 6alpha,13(S)-dihydroxystemodan-2-one (19). The bioconversion of 2beta,13(S)-dihydroxystemodane (10) by the fungus yielded 2beta,7beta,13(S)-trihydroxystemodane (20) whereas stemod-12-en-2-one (9) provided 7beta,17-dihydroxystemod-12-en-2-one (21). The results provide useful information about the relationship between the functional groups of the substrates and their potential for bioconversion.

1049. **—-.** "Stemodane Skeletal Rearrangement: Chemistry and Microbial Transformation." Phytochemistry 66.8 (2005): 901-09.

Solvolytic rearrangement of the C/D ring system of the tetracyclic diterpenoid stemodinone (2) afforded the compounds 15(13&RARR; 12)abeo-13β-hydroxvstemaran-2-one (5) and 15(8 &RARR; 9)abeo- 8β(H)-12β-hyd roxystach an-2- one (10). Terpene 5 possesses a novel diterpene skeleton. Oxidation of these compounds yielded their respective diketones. Bioconversion of 5 by Rhizopus oryzae yielded 15(13&RARR; 12)abeo-7β, 13β-dihydroxystemaran-2-one (18) while microbial transformation of 10 provided 15(8&RARR; 9)abeo-8β(H)-6α,12β-dihydroxystachan-2-one (19) 15(8&RARR; 9)abeo-8β(H)-7β, 12β-dihydroxystachan-2-one (20) and 15(8 &RARR; 9)abeo-8β(H)-6α,12β,14β-trihydroxystachan-2-one (21). A rationale for the formation of the rearranged compounds is proposed.

1050. **McKenzie, S. P., and Ishenkumba A. Kahwa.** "Novel Double Helical Tetranuclear Lanthanide(III) Nanoclusters." Abstracts of Papers of the American Chemical Society 228.Part 1 (2004): U803-U803 170-INOR.

1051. **—-.** "Novel Polynuclear Rare Earth Schiff Base Complexes." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 35.

The rare earths are a group of elements ranging from cerium to lutetium (inclusive of lanthanum, yttrium and scandium), whose peculiar magnetic, spectroscopic and chemical properties have resulted in wide and extensive studies of their compounds. Their current and potential applications have stimulated great interest and include their

use as luminescent probes, contrast agents for magnetic resonance imaging (MRI), diagnostic/therapeutic radioisotopes, as well as catalysts for the hydrolysis of DNA and RNA. Our studies have been inspired by these applications and have thus far produced novel polynucleating macrocyclic and acyclic Schiff's base chelates with unusual recognitive sites. These were synthesized by templated condensation reactions in the presence of rare earth salts, and were definitively characterized by single crystal X-ray diffraction. Structural, luminescence spectroscopic and decay dynamical results will be presented.

1052. **Minott, Donna A.** "The Chemistry of Jamaican Foods." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 54-75.

Minott, Donna A. See also 1069

1053. **Mulder, Willem H.** "Effect of Medium Relaxation on the Acidity Constants of Electronically Excited States Obtained by the Förster Cycle Method." Journal of Photochemistry and Photobiology A: Chemistry 161.1 (2003): 21-25. www.sciencedirect.com.**Refereed**

The theoretical basis for the calculation of acid dissociation constants in the lowest excited singlet or triplet state of organic compounds has been reexamined in light of a recent study on solvatochromism. A mathematical analysis based on the Onsager cavity model reveals that the absorption or emission frequency of an acid and its conjugate base, as they appear in the Förster equation, should be replaced with the averages of absorption and emission frequencies corresponding to the 0-0 transition of acid and base, respectively, in order to account for Franck-Condon effects on the free energy balance. The free energy of spontaneous medium relaxation is found to be the same for absorption and emission, and proportional to one-half of the stokes shift.

The main premise of the proposed method, besides the obvious requirement that both the acid and its conjugate base should floresce or phosphoresce, is that each excited state exists long enough for equilibrium with the medium to be established prior to emission.

1054. **—-.** "Electrical Control of the Wetting Properties of Metal Surfaces Coated With Oxidisable Organic Films." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 50-51.

1055. **—-.** "The Use of Size Distributions of Circular Domains in Langmuir Monolayers for Determining Physical Parameters of Surfacetants." Journal of Colloid and Interface Science 264.2 (2003): 558-60.**Refereed**

An analysis of equilibrium size distributions of circular liquid-condensed (LC) domains in amphiphilic monolayers at the air/water interface, gleaned from microscopic images, is presented in terms of Gaussians fitted to a theoretical expression derived previously. It is demonstrated how, in principle, important properties of the monolayer, such as molecular dipole moments of surfactant head groups and line tension of the liquid-condensed/liquid-expanded phase boundary, can be obtained by combining the results of this simplified analysis with information from X-ray diffraction or surface pressure measurements.

1056. **Mulder, Willem H., Rafael Andreu, Miguel Molero, and W. Ronald Fawcett.** "Calculation of Ionic Surface Excess Concentrations in the Diffuse Double Layer at Low Field Strengths for a Restricted Primitive Model Electrolyte." Journal of Electroanalytical Chemistry 575.2 (2005): 211-19.**Refereed**

Analytical expressions have been derived for the ionic surface excesses of a restricted primitive-model z-z electrolyte near a charged wall, by combination of a thermodynamic result with a recently derived equation for the surface potential as a function of salt concentration and surface charge density within the context of the Fawcett-Henderson method. This approximate result accounts for the finite size of ions and applies in the limit of low field strengths at the surface, corresponding to absolute surface charge densities not exceeding ca. 10 μC cm^{-2} and concentrations of at least 0.1 M. The theoretical expression has been tested via comparison with predictions based

on Gouy-Chapman theory and data obtained with Monte Carlo simulations, and has been found to show a superior performance at high concentrations and large ion sizes in the case of 1-1 electrolytes and, to a lesser extent, 2-2 electrolytes.

1057. **Mulder, Willem H., Juan José Calvente, and Rafael Andreu.** "The Electrocapillary Effect at an Electrode Modified With an Insoluble Redox-Active Self-Assembled Monolayer." Langmuir: The ACS Journal of Surfaces and Colloids. [Langmuir] 20. 3 (2004): 869-74. http://search.epnet.com/login.aspx?direct=true&db=cmedm&an=15773117.**Refereed**
The interface between an electrolyte solution and a metal electrode coated with an oxidatively adsorbed, redox-active monolayer of long-chain thiols has been examined from a thermodynamic point of view. The electrode potential is assumed to vary within the region where no reductive desorption of the thiol occurs, so that the interface may formally be regarded as ideally polarizable. The analysis leads to an expression describing the potential dependence of interfacial tension in terms of the charge density on the metal, salt concentration, dielectric properties of the organic film, and the redox properties of the active terminal groups, which vary with the (average) distance from the electrode surface. This result generalizes the classical Lippmann equation to modified electrodes of the type considered.

Mulder, Willem H. See also 994, 1002, 1008, 1022, 1023

1058. **Pinnock, Willard R.** "Utilization of Bauxite Process-Waste As Building Material." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 65.
The authors seeks to highlight the potential use of waste of bauxite as a raw material in building material. The authors report that efficacy of combining red mud with other waste materials to produce durable and strong building materials comparable to concrete is still being investigated

1059. **Pinnock, Willard R., Mark Richards, and Rashida Kahn.** "Sustainable Air Pollution Monitoring Over Kingston." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 63-64.
The authors examine the widespread use of pesticides and their effects on the environment.

Pinnock, Willard R. See also 1080

1060. **Ramdon, Dwight C., Donovan A. Dixon, and Tara P. Dasgupta.** "Mechanism of Reduction of Chromium (VI) Ion by 2-Mercaptosuccinic Acid in Aqueous Solution." Inorganica Chimica Acta 331 (2002): 178-87.**Refereed**
The kinetics of the reduction of the chromium (VI) ion by 2-mercaptosuccine acid (thiomalic acid) were studied by rapid scanning stopped flow spectrophotometry. The conditions used were $[Cr(VI)]_T$ = 0.20 mM, $[MSA]_T$ = 5-90 mM, 3.0 ≤ pH ≤ 5.6 in citric acid-phosphate buffer, or 3.3 ≤ pH ≤ 5.4 in 0.40 M acetic acid-acetate buffer, 20.0 ≤ T ≤ 35.0 °C at I = 0.50 M ($NaClO_4$). Spectrophotometric titration at 350 nm indicates the stoichiometry of the reaction to be 1:3. The kinetics of both formation and decay of the intermediate chromium (VI) thioester were followed at λ_{max}=425 nm and rate expressions, specific rate constants and corresponding activation parameters were derived from the proposed mechanism. The acetic acid-acetate buffer was found to catalyze the formation but not the decay rate of the intermediate. The citric acid-phosphate buffer and dissolved oxygen did not have any significant effect on the reaction rates. The justification of the mechanism was discussed in terms of standard biological conditions.

1061. **—-.** "Mechanistic Studies of the Reaction Between Thioglycolic Acid and Chromium (VI): Substitution, Isomerisation, and Electron Transfer." Inorganic Reaction Mechanisms 5 (2004): 1-15.**Refereed**

Thioglycolic acid, H_2TGA, containing a reactive sulphydrya group, has been shown to reduce Cr(VI). The experimental conditions were $[Cr(VI)]_T$= 0.20 mM, $[TGA]_T$=22 - 100 mM, 15.0 ≤ T ≤ 30.0 °C, 2.66 ≤ pH ≤ 4.66 (TGA self -buffer) or 2.74 ≤ pH ≤ 6.05 (citric acid-phosphate) at a constant ionic strength of 0.50 M ($NaClO_4$). The reaction was studied using rapid scanning stopped-flow spectrophotometry at λ = 425 nm. The kinetics of the reaction showed distinct spectral evidence for the formation of an intermediate that was subsequently followed by a slower, bimolecular redox process leading to the formation of the final products. Based on the analysis of the experimentation data, the formation of the intermediate involved the conversion of an O-bonded Cr(VI)-thioglycolate intermediate, $-O_3CrOC(O)CH_2SH$, to the S-bonded type $^-O_3CrSCH_2COOH$, prior to the redox step. Normal acid-base equilibria of thioglycolate (H_2TGA / $HTGA^-$) and chromate species ($HCrO_{-4}$/CrO_4^{2-}) were found to be inadequate to explain the overall mechanism. Instead, the facile reactions of both O-bonded and S-bonded (Cr(VI)-thioglycolate intermediates were seen to be influenced by their own proton dependency. It was found that depending on the nature of the buffer used, some catalytic effects were evident, but the complete pH profile obtained was inherently peculiar to the reaction involving the main reactants. Added metal ions such as Cu^{2+} and Zn^{2+} are implicated in the overall course of the reaction, and their effects also seem to be determined by the concentration of $[H^+]$ utilized.

Reese, Paul B. See also 1010, 1012, 1013, 1014, 1015, 1027, 1028, 1047, 1048, 1049, 1133

1063.**Ramsay, Debbie-Ann D, and Anthony M. Greenaway**. "Groundwater Nutrient Fluxes to Discovery Bay, Jamaica." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 59-60.

1063. **Reese, Paul B.** "Microbial and Chemical Transformation of Natural Products." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 52-54 .

1064. **Reid, R. R., and Tara P. Dasgupta.** "The Catalytic Degradation of Polychlorinated Biphenyls (PCBs)." Jamaican Journal of Science and Technology 15 (2004): 11-31.**Refereed**

Extensive investigation of the catalytic degradation of polychlorinated biphenyls (PCBs) was carried out in solution using some peroxo complexes of chromium (IV) and iron complexes in conjunction with hydrogen peroxide. The change in concentration of PCBs was measured by using a gas chromatograph attached to an electron capture detector. A mass spectrometric detector was used. The results obtained are discussed.

1065. **—-.** "The Determination of the Levels of Polychlorinated Biphenyls (PCBs) in Some Urban and Rural Areas of Jamaica." Jamaican Journal of Science and Technology 15 (2004): 2-10.**Refereed**

Studies were done to ascertain the levels of PCBs in soil, water and sediments in some urban and rural areas in Jamaica. All the soil samples collected contained less than 10 ppm PCB and PCB was found only in soil samples which were collected from sites where transformers were stored or are in use. The mean concentrations of PCBs in the urban and rural soil samples were 0.7 and 0.2 mg/kg respectively with over 80% of the samples containing less

than 2.0 mg/kg. The median concentration for the urban soil sample was 1.4 mg/kg while that for the rural was less than 0.1 mg/kg. The concentration of PCBs was measured either by using a gas chromatograph attached to an electron capture detector or a mass spectrophotometric detector.

1066. **Richards-Johnson, Roxan U., and Ishenkumba A. Kahwa.** "Syntheses, Structures and Luminescece of Novel Hexanuclear Lanthanide (III) Complexes." [Abstract]. Abstracts of Papers of the American Chemical Society 228.Part 1 (2004): U803-U803 172-INOR.

1067. —-. "Synthesis, Structure and Luminescence of a Novel Hexanuclear Lanthanide (III) Complex." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 35-36.
A series of novel hexanuclear lanthanide (III)-hydroxo complexes were prepared by reacting hydrous lanthanide salts with 1-azirideneethanol. Elemental analysis, IR and luminescence were used to characterize the complexes. Room temperature emission and excitation spectra for the europium (III) complex show typical $Eu^{3+}(^5D_0 \rightarrow ^7F_j)$ transitions. The $Eu^{3+}(^5D_0 \rightarrow ^7F_0)$ emission region is split into two as expected for crystals with two different Eu^{3+}environments. The synthesis, structures and luminescence spectroscopy and decay behaviour of the hexanuclear complexes will be presented.

1068. **Richards-Johnson, Roxan U., Ishenkumba A. Kahwa, and A. J. Lough.** "Aqua[N,N ',N '',N '''-Tetrakis(2-Hydroxyethyl)-1,4,7,10-Tetrazacyclododecane-Kappa N-4]Neodymium(III) Tris(Perchlorate) 1.25-Hydrate." Acta Crystallographica Section E-Structure Reports Online 59.Part 11 (2003): M1022-M1024. **Refereed**
The asymmetric unit of the title structure, [Nd(C16H36N4O4)-(H2O)](ClO4)(3).1.25H(2)O, (I), contains two independent Nd-III cations, six perchlorate anions and two and a half solvent water molecules. Compound (I) is a product of a program exploring the formation of polynuclear metallo-nanoclusters from oligomerization of aziridineethanol in the presence of lanthanide(III) salts. Under moderately acidic or basic solutions protonation of alcoholic sites is maintained and no oligomerization via bridging alcoholic sites is found. The crystal structure contains a three-dimensional network of O-H...O hydrogen bonds.

1069. **Roberts, Madeen M., Donna A. Minott, Paula F. Tennant, Jose C. Jackson-Malete, and Dennis Gonsalves**. "Comparative Evaluation of Transgenic and Non-Transgenic (*Carica Papaya L.*) in Jamaica." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 48-49 .

1070. **Simpson, Denise S., and Helen M. Jacobs.** "Alkaloids and Coumarins From *Esenbeckia Pentaphylla* (Rutaceae)." Biochemical Systematics and Ecology 33.8 (2005): 841-44.**Refereed**

1071. **Simpson, Denise S., and Helen M. Jacobs**. "Determination of the Minimum Energy Comformation of Glabrescol by Molecular Modeling." The Mona Symposium: (UWI, Mona: 2004).

1072. **Simpson, Gregory C., and Yvette A. Jackson.** "Comparison of the Chemical Composition of East Indian, Jamaican and Other West Indian Essential Oils of Myristical Fragrans Houtt." Journal of Essential Oil Research 14.1 (2002): 6-9.
Analyses of the essential oil of Myristica fracrans Houttuyn (nutmeg oil), from St. Catherine, Jamaica were compared with the literature data (1976-1997) for West Indian (primarily Grenadian) and East Indian nutmeg oils. GC, GC/MS and RP-HPLC strategies, were used to qualitatively and quantitatively assess the Jamaican oil which

was found to contain lower quantities (weight percent) of the phenylpropanoids myristicin (0.16%) and safrole (<0.2%), than the East Indian oils, Three isomers of ocimene, namely (E)-β-ocimene, (Z)-β-ocimene and (Z)-α-ocimene where identified in the Jamaican oil. These have not been reported as being present in the other oils under review. The monoterpenoids α-pinene (19,9%), β-pinene (18.8%), and terpinen-4-ol (17.8%) also showed differences in amounts which could lead to use of these compounds as markers to distinguish between the West Indian oils.

1073. **Singh-Wilmot, Marvadeen A., Ishenkumba A. Kahwa, and A. J. Lough.** "Octaaquatetrakis(Mu(2)-2,6-Diformyl-4-Methylphenolato)Tetra-Mu(3)-Hydroxo-Tetraneodymium(III) Trifluoromethanesulfonate Butanol Disolvate Tetrahydrate." Acta Crystallographica Section E-Structure Reports Online 61 (2005): M970-M972 Part 5, MAY 2005.**Refereed**

The title compound, [Nd-4(μ(3)-OH)(4)(μ(2)-C9H7O3)(4)(H2O)(8)](CF3SO3)(4) &BULL; 2C(4)H(10)O &BULL; 4H(2)O, was synthesized from Nd(CF3SO3) (3) and 2,6-diformyl-4-methylphenol at relatively high pH. The cation, which lies on a crystallographic twofold axis, features a cubane-type [Ln(4)(OH)(4)](8+) core of four Nd-III cations and four μ(3)-OH ligands occupying alternate vertices of a distorted cube.

1074. **Singh-Wilmot, Marvadeen A., Ishenkumba A. Kahwa, A. J. Lough, and J. Lough.** "Bis(Mu-2,6-Diformyl-4-Methylphenolato)Bis[Bis(2,6-Diformyl-4-Methylphenolato)Neodymium(III)]." Acta Crystallographica Section E-Structure Reports Online 61.Part 6 (2005): M1009-M1011 .**Refereed**

The title compound, [Nd-2(C9H7O3)(6)], crystallizes from an anhydrous alcoholic mixture of neodymium perchlorate, 2,6-diformyl- 4-methylphenol and sodium hydroxide. The structure consists of discrete dinuclear molecules with Nd-III ions in eightfold coordination environments. The complete molecule is generated from the asymmetric unit by a crystallographic center of symmetry. Intramolecular and intermolecular pi-pi stacking and C-(HO)-O-... interactions help to stabilize the crystal packing.

1075. **Smith, James N., and Tara P. Dasgupta.** "Mechanism of Nitric Oxide Release.I. Two-Electron Reduction of Sodium Nitroprusside by L-Cysteine in Aqueous Solution." Inorganic Reaction Mechanisms 3 (2002): 181-95.**Refereed**

Sodium nitroprusside (SNP) is a well-known vasodilator, which activates the cytosolic isozyme guanylate cyclase. It is quite stable by itself in aqueous solution and in the dark, but produces nitric oxide spontaneously under the appropriate reducing conditions. Both the neutral nitric oxide (NO) and the nitroxyl anion (NO^-) can be produced from SNP depending on the condition employed. NO release is favored at lower pH and cysteine concentration while NO^- formation is more likely to occur at higher pH (<7) and cysteine concentration. NO was measured by electrochemical method and the chemical detection of NH_2OH and NO_{-2} are evidences of NO^- formation. The mechanism of the reaction was found to be very complicated and involved three clear stages. NO and NO^- are postulated to form in the first and third stages, respectively. All three stages showed cysteine dependence and were also affected by the pH of the solution. The first two stages resembled stepwise reversible two-electron reduction of NO^+ to NO^- and are similar in rates. However the third stage is the slowest irreversible and rate-determining substitution of NO^- by cysteine in the reduced nitroprusside ion. Increased absorption occurs between 250 and 500 nm for the first two stages with absorption maxima at about 340 nm for the first two stages which signals NO reduction in nitroprusside. A decrease in absorption in the same region, which signals loss of NO^- was observed in the same region, which signals loss of NO^- was observed for the third stage of the reaction sequence. Cyanide release occurs in the first stage and the addition of NaCN significantly retards the reaction rate proving the reversible loss of CN^- from the nitroprusside ion. Transition metal ions are known to catalyze the decay of nitrosocompounds and addition of Cu^{2+} to reaction solutions showed significant catalysis and was especially pronounced in the final stage.

1076. **Taylor-Campbell, Francine S., and Anthony M. Greenaway**. "Water Quality in the Black River, St. Elizabeth, Jamaica." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003.

1077. **Thompson, M. K., A. J. Lough, A. J. P. White, D. J. Williams, and Ishenkumba A. Kahwa.** "Formation of Two Diverse Classes of Poly(Amino-Alkoxide) Chelates and Their Mononuclear and Polynuclear Lanthanide(III) Complexes." Inorganic Chemistry 42.16 (2003): 4828-41.**Refereed**

Factors that influence aggregation of lanthanide(III) (Ln(III)) ions to form polynuclear complexes were studied utilizing 1-aziridineethanol as a versatile source of macrocyclic and acyclic chelates. The facile ring-opening cyclo-oligomerization of 1-aziridineethanol leads to the formation of a series of polyaza cyclic oligomers (series A). In the presence of ethylenediamine, a competing N-alkylation reaction occurs to produce a new class of acyclic ligands (series B). The cyclo-oligomerization-of four 1-aziridineethanol units is the most favorable process, leading to the formation of the 12-membered cyclen-type macrocycle, H4L1 (1,4,7,10-tetrakis(2-hydroxyethyl)-1,4,7,10-tetraazacyclododecane). Ring-opening cyclo-oligomerization of 1-aziridineethanol in the presence of Ln(III) ions produces self-assembled mononuclear, tetranuclear, and pentanuclear compounds of H4L1. In the presence of ethylenediamine, oligomerization of 1-aziridineethanol results in a dinuclear complex of an acyclic poly(amino-alkoxide) H2L2. The coordinative unsaturation of (i) the alkoxy sites of [HxL1](x-4) (where $x < 4$) and (ii) Ln(III) ions in coordination numbers less than nine are critical factors in the formation of the polynuclear Ln(III) complexes. The identities of mononuclear, dinuclear, tetranuclear, and pentanuclear complexes herein discussed were established by X-ray crystallography.

1078. **Townsend, Norman O., and Yvette A. Jackson.** "Synthesis of 9-Methyl-1H-[1,4]Thiazino[3,2-g]Quinoline-2,5,10(3H)-Trione, the B,C,D Ring Core of the Shermilamine Alkaloids." Organic & Biomolecular Chemistry 1.20 (2003): 3557-63.**Refereed**

Synthesis of 9-methyl-1H-[1,4]thiazino[3,2-g]quinoline-2,5,10(3H)-trione (4), from N-(4-bromo-2,5-dimethoxyphenyl)acetamide (23) is described. Oxidative cyclisation of 2,2'-disulfanediylbis[N-(2,5-dimethoxyphenyl)acetamide] (19) to 5,8-dimethoxy-2H-1,4-benzothiazin-3(4H)-one (7b) is also reported.

1079. **White, Nicole A., Richard A. Taylor, and Henry A. Ellis.** "Phrase Transition and Structural Studies of Long Chain Metal Carboxylates." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 73-74.

The identification and properties of liquid properties in anhydrous or hydrated soaps and the possible applications are the focus of the investigations being carried out. In addition to the achievements and the processes involved in attaining the results highlighted, background information on metal carboxylates (soaps) is given.

1080. **Wilson, Kenesha S., and Willard R. Pinnock**. "Red Mud Utilization As Component of Construction Material." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 34-35.

1081. **Wright, Paul R., and Anthony M. Greenaway**. "The Estimation of Nutrient Concentration Changes in the Intersitial Waters of a Polluted Estuary Following a Simulated Remediation of the Overlying Waters." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 60-61 .

Department of Geography and Geology

1082. **Acuna, Adolfo, Eduardo Cervantes, Gerry Garland, Gaspar Gonzalez, Esteban Horna, Cassiano Monteiro Neto, Beate Ratter, Bolivar Ruiz, and Elizabeth Thomas-Hope**. "Inter-University Co-Operation in the Field of Integrated Coastal Zone Management." Proceedings of the Future Search Conference - Ten Years After Rio: Steps Towards Sustainable Use and Development of Coastal and Marine Areas : Bremen, Germany: Carl Duisberg Gesellschaft Foundation for International Training and Development, 2002.

1083. **Ahmad, Rafi**. "Deep-Seated Gravitational Block-Type Slope Movements in the Scotland District, Barbados." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 74.

1084. **—-**. "Hydropower From Natural Landslide Dams: An Alternative Source of Energy in Jamaica." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: (Faculty of Pure and Applies Sciences, University of the West Indies: Editors Daniel N. Coore and Lancashire Robert J. Kingston, Jamaica, 2003.

Reports on a field excursion intended to observe ancient landslide landforms, specifically the sites where Hope River was blocked by landslide deposits that created natural dams across the river and a lake upstream. The field trip visited a section of the Upper Hope River valley which is both geologically and historically fascinating. The field trip highlights the societal value of geology. This field guide includes a simplified geological map of the Upper Hope River Valley, landslides inventory map, and a route map. A glossary is also provided for the benefit of non-geologists.

1085. **—-.** "Natural Hazards, Human Security, Sustainable Development in the Caribbean: the Ground Rules." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 78-84.

The author looks at the landscape of the island nations of the Caribbean with special focus on Jamaica. The research aims to create an awareness of natural hazards by identifying land susceptibility due mainly to landslides.

1086. **Ahmad, Rafi, and Lawrence Brown**. "Assessment of Rainfall Characteristics and Landslide Hazards in Jamaica." [Abstract] Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 37.

1087. **Ahmad, Rafi, and David J. Miller**. "Landslides Related to Precipitation in Eastern Jamaica." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 71-72.

1088. **Alves, Alberto, Janet Brown, Werner Ekau, Hugh Govan, Andreas Kunzmann, Gerd Liebezeit, Annette Muhlig-Hofmann, Lisette Muoro-Wilson, Elizabeth Thomas-Hope, and Lilian Wetzel**. "Bismark-Solomon Seas and Solomon Islands Integrated Coastal Zone Management Pilot Project." *Proceedings of the Future Search Conference - Ten Years After Rio: Steps Towards Sustainable Use and Development of Coastal and Marine Areas*: Bremen, Germany: Carl Duisberg Gesellschaft Foundation for International Training and Development, 2002.

1089. **Arimah, Benedict C.** "Measuring and Explaining the Provision of Infrastructure in African Cities." International Planning Studies 8.3 (2003): 225-40.

There are few studies that investigate the provision of infrastructure in Africa from a cross-city perspective. This can be attributed to the dearth of reliable data. The United Nations Human Settlements programme (UN-Habitat) through its Global Urban Indicators Programme recently completed the collection of an extensive set of urban indicators for 237 cities worldwide. Drawing on the African component of this database, this paper measures and accounts for intercity variations in the provision of infrastructure. The empirical analysis reveals that the provision of infrastructure in African cities can be measured in terms of a single dimension of basic infrastructure, which comprises water, electricity, sewerage, sanitation and telecommunication services. Further analysis shows that the most important variables explaining intercity differences in the dimension of basic infrastructure are: income as measured by GDP per capita; external debt burden of the country in which the city is located; city size; public sector expenditure on infrastructure; local government's capital expenditure; and the proportion of the local authority's revenue derived from user charges.

1090. **—-.** "Poverty Reduction and Human Development in Africa." Journal of Human Development 5.3 (2004): 399-415.**Refereed**

This paper uses cross-national data to investigate the extent to which the adoption of human development strategies has resulted in a reduction of poverty in Africa. Inter-country variations in income and human poverty reinforce the established patterns of well-being within the continent, as countries in Northern and Southern Africa have the lowest levels of poverty. The empirical analysis reveals that inter-country differences in poverty levels can be accounted for by variables indicative of the different facets of human development. These include public expenditure on education, primary school enrolment, female educational enrolment, expenditure on health, and good governance. Other significant variables apart from those pertaining to human development are economic growth, high external debt, the prevalence of HIV/AIDS and the geographical disadvantage of being a landlocked country. The paper also shows that foreign aid has had a limited effect on poverty reduction in Africa.

1091. **—-.** "What Drives Infrastructure Spending in Cities of Developing Countries?" Urban Studies 42.8 (2005): 1345-68.

There exists a dearth of empirical studies on what determines infrastructure spending in cities of developing countries. This in part can be attributed to the absence of quality data and the tendency for researchers to gloss over variations in infrastructure expenditure in or across developing world cities in the general belief that investment in infrastructure is generally low. Using the United Nations Human Settlements Programme's global urban indicators database, this paper examines variations in infrastructure spending across cities in developing countries with a view to identifying the factors that explain these differences. The empirical analysis identifies substantial intercity variations in infrastructure spending both across and within the regions of Africa, Asia, the Middle East, Latin America and the Caribbean, and the economies in transition. Further analysis suggests that intercity variations in infrastructure spending are accounted for by differences in the macroeconomic environment, urban growth rate, quality of governance and financial capacity of municipal governments.

1092. **Bailey, Corin**. "Education and Social Exclusion." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 32.

This paper is part of a wider study which examines crime in the Kingston Metropolitan Area (KMA), Jamaica, as a reaction to social exclusion. The term social exclusion refers to a condition in which a large segment of the society is shut out from the systems which determine their level of social integration in the society. One of these systems is education and this is the focus of this paper. The methodology adopted is triangulation, a mixed methodology that, metaphorically, has the strengths of the geometric triangle. Interviews in four social areas in the KMA established the educational achievements of a random sample of household heads. Focus group sessions with two age cohorts in two areas probed the achievements, aspirations, and perceived barriers to the realising of the goals of participants. The test scores, sending schools and home addresses of students selected by a traditional and a new high school in 2001, as well as the qualifications of teachers were examined.

Certain 'choices' define the educational careers of students and there is inequality of educational opportunity. The

few students in poor areas who manage to beat the odds are creamed off by top schools creating a situation in which students in secondary schools in poor areas perform in accordance with how the society sees them.

1093. **Bailey, Wilma R., Clement Branche, and Aldrie Henry-Lee.** "Gender Relations and Conflict Managment in Inner-City Communities in Jamaica: The Importance of Community Participation." Participatory Planning in the Caribbean: Lessons From Practice. Editors Jonathan Pugh and Robert B. Potter. England: Ashgate , 2003. 139-54.
(Also published by Ashgate in Burlington, Vermont, USA.)
Describes an attempt to promote peaceful means of resolving conflict in three low - income communities in the Kingston Metropolitan Area in Jamaica: those of Maverly, Drewsland and Southside. It arose out of the fact that in the context of a difficult urban economic and institutional decay, violence had become a part of the accepted logic. Community workers or 'change agents' were given basic conflict resolution skills and were trained to work with individuals who felt that they could benefit from the intervention. The change agents worked in communities where disputes were of an interpersonal nature involving people who have close relationships; where the activities of criminal gangs and political factions frequently erupted into street violence. Moreover, because of entrenched social identities, conflicts spilled over community boundaries to engulf the wider urban society. In this situation, the conflict resolution strategy adopted proved to be too individualistic and interpersonal. What was needed was a programme of community mediation in which the impartial change agents were given the tools to intervene in conflicts, allowing participants to air their grievances, and assist in the negotiation of agreement. (AU)

1094. **Bailey, Wilma R., Clement Branche, Jean Jackson, and Amy Lee.** "Fatherhood in Risk Environments." Gender in the 21st Century: Caribbean Perspectives, Visions and Possibilities. Editors Barbara Bailey and Elsa A. Leo-Rhynie. Kingston, Jamaica: Ian Randle, 2004. 162-75.
Explores the concept of fatherhood in the context of risk taking in a risky environment. Also explores the dissonance between a seeming preference for marriage as the context for reproduction and the actual conduct of Jamaican men, and suggests that there are attributes of the environment that facilitate risk taking. Draws upon the results of two research projects, the Ford study and the WHO study

Bailey, Wilma R. See also 1810

1095. **Barker, David, and Clinton Beckford.** "Yam Production and the Yam Stick Trade in Jamaica: Integrated Problems for Resource Management." Resources, Planning and Environmental Management in a Changing Caribbean . Editors David Barker and Duncan McGregor. Kingston, Jamaica: University of the West Indies Press, 2003. 57-73.

Barker, David See also 1119

1096. **Brown, Ian C., Simon F. Mitchell, Daryl P. Domning, Roger Portell, and Stephen K. Donovan**. "New Fossil Sea Cow Exhibit at the Geology Museum, University of the West Indies." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 74-75.

Brown, Ian C. See also 1128

1097. **Butt, Faisal A.** "Modelling Groundwater Flow in the Alluvial Aquifer of the Lower Yallahs Basin, St.Thomas." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors. Kingston, Jamaica: Faculty of Pure and Applies Sciences, University of the West Indies, 2003. 31-32.

1098. **Butt, Faisal A., Helge Drange, Anders Elverhoi, Odd Helge Ottera, and Anders Solheim.** "Modelling Late Cenozoic Isostatic Elevation Changes in the Barents Sea and Their Implications for Oceanic and Climaticregimes: Preliminary Results." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 88-92.
Emphasizes the key role that the ocean circulation plays in regulation the climate system. Background information on the impacts of climate change and probable causes for climate change is given.

1099. **Cunningham, Kevin J., J. L. Carlson, G. L. Wingard, Edward Robinson, and Michael. A. Wacker**. Characterization of Aquifer Heterogeneity Using Cyclostratigraphy and Geophysical Methods in the Upper Part of the Karstic Biscayne Aquifer, Southeastern Florida. U.S. Geological Survey Water Resources Investigations Report WRIR 03-4208. Tallahassee, Florida: U.S. Department of the Interior, 2004. http://pubs.usgs.gov/wri/wri034208/.
(5 appendixes (on CD), and 5 plates)
This report identifies and characterizes candidate ground-water flow zones in the upper part of the shallow, eogenetic karst limestone of the Biscayne aquifer in the Lake Belt area of north-central Miami-Dade County using cyclostratigraphy, ground-penetrating radar (GPR), borehole geophysical logs, and continuously drilled cores. About 60 miles of GPR profiles were used to calculate depths to shallow geologic contacts and hydrogeologic units, image karst features, and produce qualitative views of the porosity distribution. Descriptions of the lithology, rock fabrics, and cyclostratigraphy, and interpretation of depositional environments of 50 test coreholes were linked to the geophysical interpretations to provide an accurate hydrogeologic framework. Molluscan and benthic foraminiferal paleontologic constraints guided interpretation of depositional environments represented by rockfabric facies. Digital borehole images were used to characterize and quantify large-scale vuggy porosity. Preliminary heat-pulse flowmeter data were coupled with the digital borehole image data to identify candidate ground-water flow zones.

1100. **Cunningham, Kevin J., Michael A. Wacker, Edward Robinson, Cynthia J. Gefvert, and Steven L. Krupa**. Hydrogeology and Ground-Water Flow at Levee 31N Miami-Dade County, Florida, July 2003, to May 2004. U.S. Geological Survey Scientific Investigations Map I-2846: U.S. Department of the Interior, U.S. Geological Survey, 2004.
http://sofia.usgs.gov/publications/sim/I-2846/.
The stratigraphy of the Biscayne aquifer at the Levee 31N study area is characterized by vertical lithofacies successions (VLSs) that occur individually or bundled within high-frequency cycles (HFCs). The VLSs are the smallest set of genetically related lithofacies and represent the fundamental building blocks of the Biscayne aquifer. The HFCs are defined on the occurrence of regional-scale bounding upper and lower exposure surfaces and their likely relation to fifth-order, 10- to 100-kiloyear cyclic sea-level events. The VLSs are related to a single rise and fall in relative sea level in the less than 10- to 100-kiloyear duration range (fifth order or higher), suggesting an association with sub-Milankovitch frequencies observed in patterns of cyclic deposition within the Fort Thompson Formation.

1101. **D'Aguilar, Georgtette, Edward Robinson, and Thomas A. Stemann**. "Larger Foraminiferal Associations in Eocene Limestones of the Caribbean." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 75-76.

1102. **Dodman, David R.** "Brother Man by R. Mais." Society for Caribbean Studies Newsletter 53 (2004).

1103. **—-.** "Community Perspectives on Urban Environmental Problems in Kingston, Jamaica ." Social and Economic Studies 53.3 (2004): 31-59. **Refereed**

1104. **—-.** "Feelings of Belonging: Young People's Views of Their Surroundings in Kingston, Jamaica." Children's Geographies 2.2 (2004): 185-98. http://journalsonline.tandf.co.uk/link.asp?id=3btwunq16ll6mwku .
The feelings of young people towards their surroundings have often been neglected in studies of Third World cities. In this paper, I examine these views in Kingston, Jamaica: a large, poor city with high socio-economic inequality. The young people surveyed have generally positive feelings towards their surroundings, yet are frequently excluded from making decisions about the ways in which these are managed. Their responses shed light on some of the main problems facing the city, and provide a strong case for young people's inclusion in local sustainable development planning.

1105. **—-.** "Nature, Power and Participation: An Exploration of Ecology and Equity in Kingston, Jamaica.". School of Geography and the Environment, University of Oxford, 2003.

1106. **—-.** "Participatory Planning in the Caribbean: Lessons From Practice." Progress in Development Studies 5.2 (2005): 164-66.**Refereed**

1107. **—-.** "Profitability or Postmodernity? Changing Modes in Jamaican Tourism ." Beyond the Blood, the Beach and the Banana: New Perspectives in Caribbean Studies. Editor Sandra Courtman. Kingston, Jamaica: Ian Randle, 2004. 155-69.

1108. **—-.** "Shooting in the City: An Autophotographic Exploration of the Urban Environment in Kingston, Jamaica." Area 35.3 (2003): 293-304.**Refereed**
This paper reports the results of autophotographic study carried out in Kingston, Jamaica. Cameras were distributed to high school students from different social backgrounds in order for them to record their own impressions and interpretations of the urban environment. This combination of an unusual methodology with a high level of youth participation provides a unique insight into the human-environment interactions taking place in the city, and reveals a variety of information about the ways in which social class, age and gender influence perceptions of and relationships with the urban environment.

1109. **—-.** "Urban Environment and Infrastructure: Toward Livable Cities." Cities 22.2 (2005): 177.

1110. **Donovan, Stephen K., and Trevor A. Jackson.** "*Quo Vadis* the *Transactions*? Publishing Strategy and the Future of the Caribbean Geological Conferences." Caribbean Journal of Science 40.1 (2004): 1-7. http://caribjsci.org/april%2004/40_1-7.pdf. **Refereed**
The authors are uniquely positioned to examine the vicissitudes of publishing these various volumes, having edited the abstracts and field guides (Donovan 1998) and *Transactions* (Jackson 2002) of the 15th Caribbean Geological Conferences (CGC), held in Jamaica in 1998. Our experiences have strongly indicated to us that a reassessment of the role of these various publications is desirable, perhaps essential, for their continued health and vitality. We question whether what has been the accepted pattern in the past is desirable for the 21st Century. The purpose of the present contribution is to document those factors that we consider need examination when publishing this trinity of CGC publications, put forward our arguments for future requirements and report the conclusions of an energetic discussion on the topic at the 16th CGC in Barbados in June 2002. The underlying question that prompted us to write

this essay can perhaps be summarized as "Should we continue to publish the *Transactions* and, if so, why and how (and for whom)?" This essay, both produced for and arising from the 16th CGC, will, we hope, help to encourage a more active and positive participation by delegates in all aspects of the publication process at future meetings. We hope our arguments, ideas and conclusions are of broad interest to a range of scientific disciplines.

1112. **Gunter, Gavin C., James D. Marshall, and Simon F. Mitchell**. "Palaeotemperature Estimates for the Upper Cretaceous (Late Maastrichtian) of Jamaica." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 36.

1113. **Gunter, Gavin C., Edward Robinson, and Simon F. Mitchell.** "A New Species of Omphalocyclus (Foraminiferida) From the Upper Cretaceous of Jamaica and Its Stratigraphical Significance." Journal of Micropalaeontology 21.2 (2002): 149-53.**Refereed**

The orbitoidal larger foraminifer omphalocyclus maldonensis n. sp. is described from the Maldon inlier of northwestern Jamaica, being the first record of this genus from the island. The limestone in which it occurs contains the upper cretaceous (upper maastrichtian) *Titanosarcolites* rudist fauna, together with larger foraminiferal specimens identified as *Orbitoides megaloformis* Papp & Küpper. The new species differs from *Omphalocyclus macroporus*, the only other widely recognized species, in possession a much smaller nucleus. At least some of the earlier records of *Omphalocyclus* from the upper cretaceous of Venezuela and Cuba should probably be referred to *O. maldonensis*. *J. Micropalaeontol*.

1114. **Jackson, Trevor A.** "Exploration and Exploitation of Mineral Deposit in Jamaica." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004

Reports on the use of mineralogy and chemistry of igneous rocks of Jamaica. Hence the contribution of these rocks and their derivatives due to mineralization has allowed for the exploration and exploitation of mineral deposits. Two projects, involving: gold mineralization and derivatives of igneous rocks (silica sands) are briefly examined.

Jackson, Trevor A. See also 1110

1115. **James, Ennika B., and Simon F. Mitchell**. "Dolomite Textures in Eocene Limestones of Central Jamaica." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 72-73.

1116. **James, Sherene A., and Simon F. Mitchell**. "Incised Fan Delta Deposits, West Side of the Port Morant Harbour." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 59.

1117. **Khan, Shakira A., and Simon F. Mitchell**. "Possible Source of a Major Sediment Producer on Tropical Carbonate Beaches - Amorphous Grains." [Abstract] Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 34.

1118. **Mains, Susan P.** "Summary Information on Research Addressing Race and the US-Mexico Border." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 75-77.
The author mentions the projections and coverage used in analysing changes in media depiction of immigration and the objectives and organizational strategies adopted by immigration rights and control activists in San Diego, Los Angeles and Tijuana.

1119. **McGregor, Duncan, and David Barker.** "Environment, Resources, and Development: Some Reflections on the Caribbean Research Agenda ." Resources, Planning and Environmental Management in a Changing Caribbean . Editors David Barker and Duncan McGregor. 1-10.

1120. **Miller, David J., and Simon F. Mitchell.** "Palaeokarstic Surfaces in the Upper Cretaceous Limestones of Central Jamaica." Cretaceous Research 24 (2003): 119-28.**Refereed**
Two prominent pitted surfaces in rhythmic, late maastrichtian, rudist-bearing limestones in central Jamaica are described. The lower surface is pock-marked with small pits that form a nodular, mamillated surface. The pits are roughly circular to gently elliptical in plan view. They vary in diameter from 5-170 mm and in depth from 5-90 mm, and are oriented perpendicular to bedding. This surface is buried beneath a lignite-rich siltstone bed. The upper surface contains microkarren phenomena represented by small cylindrical potholes up to 40 mm in diameter and 30 mm deep. These surfaces are interpreted as palaeokarstic because the pits are: (1) perpendicular to bedding and not the present land surface; (2) infilled with very poorly sorted siltstone, and (3) overlain by lignitic shales indicating terrestrial influx. The presence of two palaeokarstic surfaces in late maastrichtam limestones suggest short-period cycles in relative sea level, consistent with glacial-eustatic driving mechanisms.

Miller, David J. See also 1087, 1128

1121. **Mitchell, Simon F.** "Morphology, Microstructure and Stratigraphy of Some Late Cretaceous Radiolitid Rudists From Jamaica." Geologia Croatica 56.2 (2003): 149-71.**Refereed**
Radiolitid rudists from the upper maastrichtian of Jamaica include genera *Bournonia, Biradiolites* and *Thyrastylon.* Three species of *Bournonia* were recognised, B. *cancellata* WHITFIELD, B. *barretti* TRECHMANN and B. *thiadensi* VERMUNT. B. *cancellata* evolves into B. *barretti* by the acquisition of costae on the anterior side. The species of *Bournonia* are characterised by a distinctive cardinal apparatus, a thick inner shell layer, and an outer shell layer composed of cellular microstructure. Two species of *Biradiolites* are recognised - B. *rudissimus* TRECHMANN has an outer layer composed of cellular microstructure with occasional bands of compact microstructure, particularly in the radial bands, and B. *jamaicensis* TRECHMANN has a very well organised outer layer with an inner band of cellular microstructure and an outer band of compact microstructure. *Biradiolites* and *Thyrastylon* have a similar dentition, a thin inner layer and similar wall structures in the outer layer. *Thyrastylon* is distinguished from *Biradiolites* by the infolding of the radial bands in RV and by the presence of oscules in LV. The evolutionary change from Bo. *cancellata* to Bo. *barretti*, and the first appearance of Bi. *jamaicensis* are probably useful biostratigraphic markers of the upper maastrichtian.

1122. **—-.** "Palaeoecology of Corals and Rudists in Mixed Volcaniclastic-Carbonate Small-Scale Rhythms (Upper Cretaceous, Jamaica)." Palaeogeography, Palaeoclimatology, Palaeoecology 186 (2002): 237-59.**Refereed**
The Guinea Corn formation (central Jamaica, West Indies) is represented by alternating platform carbonates and volcaniclastic sandstones and siltstones and represents the most landward shift of facies in an Upper Campanian to maastrichtian transgressive-regressive cycle. The succession consists of 2-30-m-thick rhythms comprising a lower volcaniclastic siltstone/sanstone division; a middle volcaniclastic siltstone/limestone with abundant corals or the rudist *Antillocaprina stellata*; and an upper division of rudist rudstones and floatstones. The lower division consists of either bioturbated sandy siltstones with lignite and abundant gastropods and infaunal bivalves (lower rhythms in

the Guinea Corn Formation), or interbedded volcaniclastic siltstones and normally graded sandstones. The rudist limestones are parallel-bedded and consist of high-abundance mono- to paucispecific assemblages. The boundary between the middle and upper parts of rhythms contains a concentration of oncoids with coral nuclei and a mantle of microbial laminates, red algae and serpulids. Four coral assemblages are recognised based on diversity and coral morphology. The *Paracycloseris-Dasmosmilia* assemblage occurs in the lower division of the rhythms and is interpreted as a soft-substrate assemblage that was adapted to elevated nutrient levels. The *Ovalastrea-Actinacis*, Actinacis-Multicolumnastrea and *Actinacis-Calampohyllia-Gyrodendron* assemblages occur in the middle parts of the rhythms and consist of bedded rudstones, rudstone mounds and rarer platestones, pillarstones amd mixstones. Polyparia arrangements, colony morphology and low diversity suggest the *Ovalastrea-Actinacis* and *Actinacis-Multicolumnastrea* assemblages were adapted to high sedimentation rates. The more diverse *Actinacis-Calamophyllia-Gyrodendron* assemblage is interpreted to have grown under more optimum conditions (low sedimentation rates and high light intensities). Rudists are classified on their growth orientation (elevator, clinger, recumbent) and on their communal relationships (isolated or clustered). The cluster elevator *Biradiolites mooretownensis* occurs in the lower division of rhythms and the recumbent A. stellata occurs in the middle part of rhythms . The upper part of rhythms contains abundant rudists including isolated elevators (*Antillocaprina occidentalis*), cluster elevators (*Bournonia* spp., *Biradiolites jamaicensis*, *Thyrastylon* spp. and *Chiapasella radiolitiformis*) and clingers (*Plagioptychus* spp.), with the topmost part contains the large recumbent *Titanosarcolites*.

1123. **—-.** "Sedimentology and Stratigraphy." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 93-96.
Reports on the completed study of sedimentology and stratigrapy that the author has undertaken over the last years. The analysis of the findings of these cummulative research/projects and their application to the development of resources in Jamaica is considered.

1124. —-. Sedimentology and Tectonic Evolution of the Cretaceous Rocks of Central Jamaica: Relationships to the Plate Tectonic Evolution of the Caribbean.
Detailed mapping and logging of successions in the Central inlier of central Jamaica has been undertaken. The succession contains three angular unconformities that allow the division of the succession into four units. The oldest rocks, the Arthurs Seat Formation, consist of a lower series of tholeiitic basaltic lavas and an upper unit of poorly sorted conglomerates with some calc-alkaline lavas. They represent lavas and proximal volcaniclastic deposits of a late early or early late cretaceous volcanic center. The late satonian to early Campanian Crofts Hill Synthem (Peters Hill Formation, Back River Formation [new], and Dawburns Content Formation [new]) rests unconformably on the Arthurs Seat Formation. It represents a deepening-upward succession, beginning with rudist limestones and ending in turbiditic sandstones and shales. The unconformity at the base of the Crofts Hill Synthem is interpreted as the result of a rifting event that created an intra-arc to back-arc basin, in which the rocks of the Crofts Hill Synthem were deposited. The Crofts Hill Synthem is cut by late Campanian thrust faults that dip toward the north. This thrusting was caused by the collision of the western part of the Greater Antilles arc with the Yucatán Peninsula. The Maastrichtian Kellits Synthem represents a transgressive-regressive cycle that rests unconformably on the rocks of the Arthurs Seat Formation and Crofts Hill Synthem. The succession begins with braided stream deposits (Slippery Rock Formation) and passes upward through tidal-flat siltstones (Thomas River Formation) into open-shelf limestones (Guinea Corn Formation). The succeeding Summerfield Group represents a progradational volcaniclastic braid-plain delta complex (Green River, Peckham, and Mahoe River Formation) and is succeeded by a thick succession of ignimbrites (Waterworks Formation). The volcaniclastic sediments and ignimbrites are interpreted to have been shed from a newly emergent volcanic center in eastern Jamaica, possibly the Above Rocks magma chamber. The Kellits Synthem is overlain uncomformably by the limestones and clastics of the middle Eocene Yellow Limestone Group. This unconformity is interpreted to represent the initiation of northeast-southwest-directed extension that saw the formation of the Wagwater Trough in eastern Jamaica.

1125. **Mitchell, Simon F., and Gavin C. Gunter.** "Biostratigraphy and Taxonomy of the Rudist Chiapasella in the Titanosarcolites Limestones (Maastrichtian) of Jamaica." Cretaceous Research

(2002): 473-87. http://www.idealibrary.com. **Refereed**
The taxonomy of the radiolitid rudist *Chiapasella* Müllerried from the *Titanosarcolites* Limestones of Jamaica is revised based on the bed-by-bed collection of specimens from the Central and Maldon inliers. Two species are recognised: *Chiapasella radiolitiformis* Trechmann and C. *trechmanni* sp. nov. C. *radiolitiformis* is characterised by usually one or more costae (two or more infolds) in the interband, by the relatively narrow ventral band Vb, and by a costal ornamentation of strong growth lines and subsidiary vertical striations. C. *trechmanni* is characterised by the usual presence of no costae (one infold) in the interband, by the relatively wide Vb, and by a costal ornamentation dominated by vertical striations rather than horizontal growth lines. Two zones are recognised in the *Titanosarcolites* Limestones, a lower zone with C. *radiolitiformis* (B and Middle C Beds of the Central Inlier) and an upper zone with C. *trechmanni* (D and lower F Beds of the Central Inlier; Maldon Limestone, Popkin Shales and Vaughansfield Limestone of the Maldon Inlier).

1126. **—-.** "First Record of the Rudist Bivalve *Mitrocaprina Tschoppi* (Palmer) From the Maastrichtian of Jamaica." Caribbean Journal of Science 40.3 (2004): 392-96. http://caribjsci.org/dec04/40_392-396.pdf. **Refereed**
The large plagioptychid rudist bivalve *Mitrocaprina tschoppi* (Palmer) is recorded from the Guinea Corn Formation (Late Maastrichtian) of central Jamaica. This is the first record of this species outside of Cuba. ***M. tschoppi*** occurs in rhythm D6 of the Guinea Corn Formation, *Macgillavryia* Bed 1, together with a rudist assemblage including *Praebarrettia sparcilirata* (Whitfield), *Macgillavryia nicholasi* (Whitfield), *Chiapasella trechmanni* Mitchell & Gunter, *Plagioptychus zansi* Chubb, *Titanosarcolites* sp.; *Titanosarcolites* cf. *alatus* Chubb and *Antillocaprina* cf. *occidentalis* (Whitfield). The pallial canals of the Jamaican specimens are identical to the Cuban material, but the Jamaican specimens are larger (about one and a half times the size).

1127. **Mitchell, Simon F., Shakira A. Khan, R Maharaj, and Edward Robinson**. "Carbonate Beach Sediment Composition at a Tourist Beach, Negril, Jamaica." Carbonate Beaches 2000: First International Symposium on Carbonate Sand Beaches, (Westin Beach Resort, Key Largo, Florida, U.S.A.: December 5-8, 2000) Editors O. T. Magoon, L. L. Robbins, and L. Ewing. Reston, VA: American Society of Civil Engineers, 2002. 204-17.

1128. **Mitchell, Simon F., Thomas A. Stemann, Donovan Blissett, Ian C. Brown, Winston O'Brian Ebanks, Gavin C. Gunter, David J. Miller, Andrew G. Pearson, Byron S. Wilson, and Winston A. Young.** "Late Maastrichtian Rudist and Coral Assemblages From the Central Inlier, Jamaica: Towards an Event Stratigraphy for Shallow-Water Caribbean Limestones." Cretaceous Research 25 (2004): 499-507.**Refereed**
The lithological succession of the Guinea Corn formation in the slippery rock river, central Jamaica, comprises 91 m of limestones and subsidiary mudstones. The biostratigraphic distribution of rudist bivalves and corals demonstrates that the succession of biostratigraphic markers is consistent with the previously standard Guinea Corn formation succession in the Rio Minho between Grantham and Guinea Corn, central Jamaica. Additionally, the slippery rock river succession shows the boundary between the *Chiapasella radiolitiformis* and C. *trechmanni* zones that has not previously been documented. The marker horizons are also consistent with major facies changes within both sections, demonstrating that both lithological changes and biostratigraphic markers are synchronous within the limestones successions of central Jamaica. This may prove to be a valuable tool for stratigraphic correlation elsewhere in Jamaica and within the Antillean region.

Mitchell, Simon F. See also 1096, 1112, 1113, 1115, 1116, 1117, 1120

1129. **Mugisa, Ezra K., Richard A. Pyne, and Errol H. Dennis.** "The 'Morresa' Project." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 114-17.
The author describes the purpose of MORRESA (Mona Repository of Reusable Software Assets) and its undertakings. The activities of MORESSA is reported to surround the building of a repository of reusable software assets for software development for reuse.

1130. **Robinson, Edward.** "Changes Along the Coast of Vere, Jamaica, Over the Past Two Hundred Years: Data From Maps and Photographs." Quaternary International 120 (2004): 153-61.**Refereed**
Analysis of air photographs and maps indicates complex patterns of shoreline changes along the south coast of Vere, Jamaica, between the mouths of the Rio Minho and Milk River. These include up to half a kilometre of shore-normal coastal recession between 1941 and 1991, the largest known shoreline change in Jamaica over the past 60 years. Previously, the coastline had been prograding seawards from a low cliff cut into the Rio Minho alluvial fan, in the process constructing a shore-parallel ridge and lagoon complex. The cliff itself is evidence of earlier coastal erosion. Maps published in 1804 and 1885 confirm the mobility of this coastline in historical times. They suggest that the more easterly complex of shore-parallel lagoons was constructed prior to about 1880, while the more recent, westerly beach ridges developed, at least partly, from progressive destruction of the lagoon complex, following a change in orientation of the Rio Minho mouth in the late 19th Century. Photographs of 1999 indicate the onset of accretion, probably resulting from the gradual onshore movement of massive quantities of sediment deposited off the Rio Minho mouth during the extreme flood event of 1986 and several lesser events in 1988 and the 1990s.

1131. **—-.** "Upper Paleogene Larger Foraminiferal Succession on a Tropical Carbonate Bank, Caribbean Region." From Greenhouse to Icehouse: The Marine Eocene-Oligocene Transition. Editors D. R. Prothero, L. C. Ivany, and E. A. Nesbitt. New York: Columbia University Press, 2003. 294-302.

1132. **—-.** "Zoning the White Limestone Group of Jamaica Using Larger Foraminiferal Genera: A Review and Proposal." Cainzoic Geology 3.1-2 (2004): 37-75.**Refereed**
A scheme of biozones with at least local application, is proposed for strata of the White Limestone Group of Jamaica, based on larger benthic foraminiferal genera. Four zones, the *Asterocyclina*, *Eulepidina*, *Miogypsina* and *Amphistegina* zones, extend through the Eocene, Oligocene, Lower Miocene, and Middle Miocene and higher horizons, respectively. The *Asterocyclina* Zone is divided into four subzones, three of Middle Eocene and one of Late Eocene age. The lowest of these includes strata of the Yellow Limestone Group, but only doubtfully of the White Limestone Group in central Jamaica. The *Eulepidina* Zone is divided into three subzones, the *Miogypsina* Zone into two. The *Amphistegina* Zone contains one subzone, the *Nummulites* Subzone, which extends through the upper part of the White Limestone Group. The higher part of the *Amphistegina* Zone is not divided. Further subdivision within some subzones is indicated, but not formalised. Correlation of the zones and subzones with larger foraminiferal genera of the platform interior still presents problems for Oligocene and Miocene horizons. Assemblages containing *Praerhapydionina delicata* are assigned to the Oligocene. Those with archaiasinids, resembling A. *kirkukensis*, are found near the Oligo-Miocene boundary, and may span the stratigraphic interval marked by the occurrence of *Heterostegina (Vlerkina) antillea*. The '*Amphisorous matleyi*' fauna of earlier workers appears to be wholly of Miocene age.

Robinson, Edward See also 1099, 1100, 1101, 1113, 1127

1134. **Spence, Balfour, and Elizabeth Thomas-Hope.** "Agrobiodiversity and Agrochemical Use by Smallholders in Jamaica." *People, Land Management and Ecosystem Conservation* .6 (2005): 10-15.

Spence, Balfour See also 1149, 1150

1135. **Stemann, Thomas A.** "Reef Corals of the White Limestone Group of Jamaica." Cainozoic Research 3.1-2 (2004): 83-107.**Refereed**

Sedimentary rocks of the White Limestone Group of Jamaica were deposited in a range of shallow-to-deep-water marine settings from the Middle Eocene to Middle Miocene. Horizons rich in scleractinian corals occur throughout this lithologic unit. The present study, using large, new collections (>2,000 specimens) and museum specimens, recognizes 98 scleractinian species in 42 genera in the White Limestone Group. Thirty-six of these species have not been previously described in the literature. From the Middle to Upper Eocene, eleven species are reported from the Troy Formation, twelve from the upper Middle Eocene Swanswick Formation and eleven species from the Late Eocene Somerset Formation. In the Moneague Formation, fifty-two species are recorded from the lower part of the Upper Oligocene succession in units formerly mapped as the Browns Town Formation. Also, in the uppermost Oligocene of the Moneague Formation, sixty-four coral species are reported from rocks formerly mapped as the Newport Formation. An additional fifteen species are reported from the Early Miocene portions of the Montpelier Formation. In addition to scleractinian corals, a stony octocoral species (Parapolytremacis sp.) is found in the Upper Oligocene of the Moneague Formation, and at least two species of Millepora (class Hydrozoa) are recorded from the Eocene and Oligocene portions of the White limestone Group. Coral assemblages from the Eocene of the White Limestone Group are largely dominated by scattered, thinly branched and free-living corals, while Late Oligocene assemblages contain a diverse group of large massive, plate-shaped and branched corals in a system of patch reefs and coral carpets. The early Miocene assemblage represents a possible deeper forereef community transported into deep water sediments in an olistostromic block. The total number of species found exceeds that known from any other single region or lithologic unit in the Caribbean Eocene through Miocene.

Stemann, Thomas A. See also 1101, 1128

1136. **Steuber, Thomas, Simon F. Mitchell, Dieter Buhl, Gavin C. Gunter, and Haino U. Kasper.** "Catastrophic Extinction of Caribbean Rudist Bivalves at the Cretaceous-Tertiary Boundary." Geological Society of America 30.11 (2002): 999-1002.**Refereed**

Strontium isotope ratios ($^{87}Sr/^{86}Sr$) in pristine low-Mg calcite of shells of rudist bivalves from the *Titanosarcolites* limestones exposed in the Central, Maldon, and Marchmont inliers of Jamaica indicate that species-rich rudist-coral associations persisted into the latest Maastrichtian (66-65 Ma). This finding contradicts the currently accepted hypothesis of stepwise extinction of rudist bivalves in the middle Maastrichtian and argues for a catastrophic, impact-related demise of Caribbean Cretaceous reefal ecosystems at the Cretaceous-Tertiary boundary.

1137. **Thomas-Hope, Elizabeth.** "Caribbean Migration and the Transnationalization of Social Capital." Le Monde Caraïbe: Défis Et Dynamiques . Editor Christian Lerat. Vol. vol. 1. Bordeaux: Maison des Sciences de l'Homme d'Aquitaine, 2005. 119-34.

1138. —-. "Human Trafficking and 'Illegal' Migration in the Caribbean." Proceedings of the Conference on International Migration: Human Rights and the Trafficking of Persons in the Americas: Santiago, Chile: UN Economic Commission for Latin America and the Caribbean - ECLAC, 2003.

1139. —-. Irregular Migration and Asylum Seekers in the Caribbean . Discussion Paper No. 48. Helsinki, WIDER: United Nations University, World Institute for Development Economics Research (WIDER) , 2003.

1140. **—-.** "No Nook or Ground Secure From Rash Assault? Ecotourism, Heritage Tourism and the Jamaican Maroons." Caribbean Tourism: More Than Sun, Sand and Sea. Editor Chandana Jayawardena. Kingston Jamaica. Ian Randle Publisher, 2005. 193-204.

1141. **—-.** "The People Land Management and Environmental Change Project." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 84-88.
The author reports on the project undertaken by the Environmental Management Unit of the Department of Geography and Geology, involving small farmers working in the lower reaches of the Rio Grande Valley, to develop sustainable and participatory approaches to conservation and biodiversity. The work focuses on the promotion of biodiversity and conservation in agricultural landscapes with emphasis on the small farming system. The objectives, activities and accomplishments of the project are reported.

1142. **—-.** " Poverty and Irregular Migration in the Caribbean." Poverty, Migration and Asylum . (eds.) George J. Borjas and Jeff Crisp. London: Palgrave Macmillan, 2004. 14:1-14:36.

1143. **—-.** "Race and Migration in the Hispanic Caribbean: The Reception of West Indians in Panama, Costa Rica and Cuba (1840-1940)." The Socio-Economic and Cultural Impact of West Indian Migration to Costa Rica (1870-1940) . Editor Annette Insanally. Kingston, Jamaica: The Latin American-Caribbean Centre (LACC), 2003. 46-57.
(Third Seminar in the Series on Intra-Regional Migration, UWI)

1144. —-. "Resource Valuation Techniques in Promoting the Sustainable Use of Coastal Resources: The Case of Ocho Rios, Jamaica." Proceedings of the Future Search Conference - Ten Years After Rio: Steps Towards Sustainable Use and Development of Coastal and Marine Areas : Bremen, Germany: Carl Duisberg Gesellschaft Foundation for International Training and Development, 2002.

1145. —-. Shifting Location and Negotiating Place: Migration and Gender in Caribbean Migration. UWI, Mona: Centre for Gender Studies, 2003.
(Research Report to the Centre for Gender Studies)

1146. —-. Skilled Return Migration: The Jamaica Case. Geneva: International Labour Organization, 2003. CD-ROM.

1147. —-. "Taking More Than Giving Back? Tourism and the Sustainability of Caribbean Small Island Developing States." Proceedings of the Session of the International Research Foundation for Development, World Forum on Small Island Developing States: (Mauritius: Univ. of Mauritus 2005).

1148. —-. "Trafficking in the Caribbean and the Human Rights of Migrants." Proceedings of the Conference of the United Nations Economic Commission for Latin America and the Caribbean Conference Report: (Santiago, Chile: 2002).

1149. **Thomas-Hope, Elizabeth, and Balfour Spence**. Biodiversity in Sustainable Agricultural Practices: Implications for Agrochemical Usage in Jamaica. Kingston, Jamaica : Jamaica Institute of Environmental Planners, 2003. [CD-ROM].

1150. **—-.** "Jamaica." Agrodiversity: Learning From Farmers Across the World. Editors Harold Brookfield, Helen Parsons, and Muriel Brookfield. Tokyo and New York: United Nations University Press, 2003. 270-92.

Thomas-Hope, Elizabeth See also 1082, 1088, 1134

Department of Life Sciences

1151. **Aiken, Karl A.** "Age Determination of Fishes Using Otoliths (Earstones)." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 22-24.

1152. **Aiken, Karl A., D. Morris, F. C. Hanley, and R. Manning.** "Aquaculture in Jamaica." Naga, World Fish Center Quarterly 25.3 & 4 (2002): 10-15.**Refereed**

Jamaica, with its overfished marine resources, has become a major tilapia producer in Latin America led by a small number of large farms practicing tilapia culture with considerable commercial success. Across the country, however, aquaculture is typically practiced by a large number of small - scale fish farmers who own less than 1.0 ha of land. Production is constrained by lack of credit, finite land space and suitable soil type, but larger existing aquaculturists are expanding further for overseas markets. Inspired by pioneering tilapia fish culture demonstration projects funded by the USAID and the government of Jamaica, fish culture production rose from a few hundred kg of Oreochromis niloticus in 1997, to about 5000 t of processed fish mainly red hybrid tilapia, in 2000. Most of this quantity was exported to Europe and North America.

Aiken, Karl A. See also 1172, 1183

1153. **Arya, D. P., L. Xue, and Paula F. Tennant.** "Combining the Best in Triplex Recognition: Synthesis and Nucleic Acid Binding of a BQQ-Neomycin Conjugate ." Journal of the American Chemical Society 125 .27 (2003): 8070-71.**Refereed**

Synthesis of a BQQ-neomycin conjugate is reported. The conjugate combines two ligands, one known to intercalate triplexes (BQQ) and another known to bind in the triplex groove (neomycin). The conjugate stabilizes T·A·T, as well as mixed base DNA triplex, better than neomycin, BQQ, or a combination of both. The conjugate selectively stabilizes the triplex (in the presence of physiological salt concentrations), with as little as 4 M of the ligand leading to a *T*C. Competition dialysis studies show a clear preference for the drug binding to triplex DNA/RNA over the duplex/single strand structures. Modeling studies suggest a structure of neomycin bound to the larger W-H (Watson-Hoogsteen) groove with BQQ intercalated between the triplex bases.

1154. **Bennett, Chanda E., Rob DeSalle, and Byron S. Wilson**. "Preliminary Review of the Population Structure of an Exotic Invasive Carnivore, Herpestes Javanicus, in the West Indies." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 66-67.

1155. **Bennett, Kerri-Ann L., and Eric J. Hyslop**. "A Study of the Taxonomy of Gambusia Spp. Poey 1854 in Jamaican Rivers Using Molecular and Morphological Techniques." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 64-65.

1156. **Bigg, Grant R., and Dale F. Webber.** "The Impact of Coastline Change and Urban Development on the Flushing Time of a Coastal Embayment, Kingston Harbour, Jamaica." Bulletin of Marine Science 73.2 (2003): 291-305.**Refereed**
Kingston Harbour, Jamaica has a history of eutrophication due to nutrient loadings emanating from the city of Kingston. In this study a two dimensional, numerical, hydro-dynamic model of the harbor is used to assess the impact of coastal development at the western end of the harbor and on the evolution of this eutrophication. The model shows that the development did not materially affect the flushing of the harbor; therefore the rapid increase in eutrophication since 1970 must be linked to concurrent population pressure. However, the coastal modification has altered the circulation pattern within Hunts Bay and has reduced the exchange between Hunts Bay and the remainder of Kingston Harbour. Increased siltation and further eutrophication within Hunts Bay are predicted as the impact of the modification. The model was also used to investigate the feasibility of aiding the flushing of the harbor by adding a second entrance. The model showed that such an opening is likely to have negligible impact on the present flushing time.

1157. **Buddo, Dayne St. A., Russell D. Steele, and Emma Ranston D'Oyen.** "Distribution of the Invasive Indo-Pacific Green Mussel, Perna Viridis, in Kingston Harbour, Jamaica." Bulletin of Marine Science 73.2 (2003): 433-41.**Refereed**
In February 1998, green mussels were first observed during the collection of mangrove roots from Kingston Harbour on the south coast of Jamaica by researchers at the University of the West Indies, Mona. Preliminary observations of its morphological characteristics identified the mussel as *Perna viridis*, and this was confirmed by reference to the retractor muscle scars of the inside of the shells and ultimately by chromosome number. Prior to the first sighting in Jamaica, *P. viridis* was seen in Trinidad (1990), and subsequently in Tampa Bay, Florida (1999). A preliminary survey of 29 random sites was carried out in July 1999, which revealed that the mussel had established itself at numerous sites around the Harbour. Ten of these sites were monitored monthly for one year from February 2000 to January 2001 for mussel density, physicochemical parameters, suspended solids, microalgae, and gut contents. Densities varied throughout the year and appeared to be affected by salinity, substrate availability and removal by persons. Analysis of the gut contents of several of these mussels revealed the presence of four species of toxic microalgae, as well as a large amount of organic material. Further studies aimed at following the spread of this invading species are in progress.

1158. **Chin, Melanie, Walter Morris, Paula F. Tennant, Mohammed H. Ahmad, and Dennis Gonsalves.** "Biological and Molecular Characterization of Papaya Ringspot Virus Isolated From Papaya Orchards of Different Locations in Jamaica." Jamaican Journal of Science and Technology 14 (2003): 58-66.**Refereed**
Papaya ringspot virus type-p (PRSV) may have been present in Jamaica as early as 1929. However, it has only recently become a serious threat to papaya production in the island. Both newly established commercial orchards and traditional papaya growing regions of the island are plagued with PRSV. In this study the diversity of PRSV from four locations of the major papaya producing areas in Jamaica was examined to assist in the development of transgenic papaya for the control of the disease across the island. Serology and host range confirmed that the virus samples collected were type-p. Moreover, the host range examined showed no differences in pathogenicity either in symptom expression or in the rate of symptom development. Reverse transcriptase-polymerase chain reaction was used to amplify the coat protein genes of the virus samples. Comparative restriction fragment length polymorphism (RFLP) analyses did not differentiate between samples from the four locations; all gave similar RFLP patterns suggesting low variability within a location and between the four locations examined. The coat protein gene of one of the samples was sequenced. The Jamaican isolate shares 90.2 to 94% amino acid similarities with type-p strains from the Caribbean, the Americas, and Australia. Other isolates are to be cloned and similarly sequenced, however, it appears that transgenic papaya resistant to Jamaican PRSV isolates should be obtained using viral coat protein genes.

1159. **Cohen, Jane E., and Dave G. Hutton**. "Herbicidal Effectiveness of Three Household Disinfectiants: Preliminary Findings." [Abstract]. Proceedings of the Sixth Conference, Faculty of

Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 87.

Cohen, Jane See also 1176, 1182

1160. **Cushnie, Anya V., and Mark A. Thomas** . "The Effect of Embryonic Oxidative Status on Insulin, Haemoglobin and Cardiac Troponin-I Expression in the Zebrafish." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003.

1161. **DAndrea, Michela E., and Eric J. Hyslop**. "A Survey of the Freshwater Fauna of the Cockpit Country, Jamaica." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003.

1162. **Davis, Herlitz A., and Peter A. Vogel**. "Effects of Forest Degradation on Bird Communities in the Cockpit Country, a Limestone Karst Region of Jamaica." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 38-39

1163. **Dunbar, Francine N., and Mona K. Webber.** "Zooplankton Distribution in the Eutrophic Kingston Harbour, Jamaica." Bulletin of Marine Science 73.2 (2003): 343-59.**Refereed**
The purpose of this study was to describe the spatial distribution of zooplankton relative to water quality throughout Kingston Harbour. Routine sampling was conducted monthly at 24 stations in the harbor over a 15- month period. In total, 73 different taxa were identified of which the copepods were most important (38 species). The outer harbor region showed the greatest number of species, while the lowest diversity was recorded at Hunts Bay and in the Upper basin region of Kingston Harbour. Mean abundances for the area were high and ranged from a minimum of 3663 animals m^{-3} in Hunts Bay, to a maximum of 80,464 animals m^{-3} in the Inner harbor zone at station 8. Results of the zooplankton community similarity index (PSC), using station 4 (located within the Upper basin) as the 'home' or focal station, pointed to the existence of three groups of stations in Kingston Harbour: Upper basin (stations 1-6), Inner harbor (stations 7-15) and Outer harbor (stations 16-23). Hunts Bay (station 24) was not included in any of these groups. Dendrograms using mean Euclidean distance indicated similar groups. These groups of stations could also be identified by dominance of individual species. Temora turbinata was dominant in the Upper basin group (stations 1-6), Lucifer faxoni and Penilia avirostris in the Inner harbor group (stations 7-15), Paracalanus crassirostris in the Outer harbor group (stations 16-23), and *Acartia tonsa* in Hunts Bay (station 24). Therefore, it may be more reliable to distinguish the zones in Kingston Harbour on the basis of the zooplankton community composition and species dominance, rather than simply on the basis of abundance and diversity. However, the low diversity (indicated by number of species) and low abundances identified Hunts Bay as the most polluted area of Kingston Harbour.

1164. **Ellis-Tabanor, M., and Eric J. Hyslop.** "Effect of Sublethal Concentrations of Endosulfan on Growth and Fecundity of Two Species of Snails." Bulletin of Environmental Contamination and Toxicology 74 (2005): 1173-78.**Refereed**
Endosulfan (Thiodan 35 EC) is an organochlorine, cyclodiene insecticide, [6,7,8,9,10-hexachloro-1,5,5a,6,9,9a-hexahydro-6,9,-methano-2,4,3-benzodioxathiepine-3-oxide (Rao and MUrty 1982)], which is currently registered for use on coffee in Jamaica to control the coffee pest, *Hypothenemus hampei* Ferrari (Pesticide Control Authority,

Jamaica - Personal Communication). It is known to have entered several Jamaican rivers and streams through run off from coffee farms (Mansingh et al. 1995). Endosulfan is recorded as having adverse effects on the density, growth and reproduction of aquatic organisms (IPCS 1984; Muirhead-Thomson 1987; Hassal 1990; Naqvi and Vaishnavi 1993; Raloff 1998). Two prosobranch snails, *Melanoides tuberculata* and *Thiara granifera* (Family : Thiariade) are common in Jamaican rivers, streams and ponds. Both species are parthenogenetic and viviparous (Beery and Kadri 1974; Dudgeon 1986), and both are introduced into Jamaica. Both species are readily available, easy to rear under laboratory conditions and can tolerate frequent handling. Very little information is available on the toxicity of endosulfan to snails (IPCS 1984; Muirhead-Thomson 1987). This study investigated the impact of sub-lethal concentrations of endosulfan on growth and fecundity of *Melanoides tuberculata* and *Thiara granifera* under laboratory and field conditions.

1165. **Fender, Andrea B., and Eric J. Hyslop**. "Evaluation of the Benthic Macroinvertebrate Fauna of Rio Cobre and Selected Tributaries, With Special Emphasis on the Family Thiaridae, Gastropoda." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003.

1166. **Fermin, Gustavo, Paula F. Tennant, Carol Gonsalves, David Lee, and Dennis Gonsalves.** "Comparative Development and Impact of Transgenic Papayas in Hawaii, Jamaica and Venezuela." Transgenic Plants: Methods And Protocols 286 (2004): 399-430. http://www.humanapress.com/ChapterDetail.pasp?isbn=1-59259-827-7&ccode=1-59259-827-7:399&returntoisbn=. **Refereed**

The authors present data concerning the creation of transgenic papayas resistant to Papaya ringspot virus (PRSV) and their adoption by three different countries: USA (e.g. Hawaii), Jamaica and Venezuela. Although the three sets of transgenic papayas showed effective resistance to PRSV, adoption rate in each country has varied from full exploitation in Hawaii, to aggressive testing but delay in deregulating of the product in Jamaica, to rejection at an early stage in Venezuela. Factors that contributed to the rapid adoption in Hawaii include a timely development of the transgenic product, PRSV causing severe damage to the papaya industry, close collaboration between researchers and the industry, and the existence of procedures for deregulating a transgenic product. In Jamaica, the technology for developing the initial field-testing of the product progressed rather rapidly, but the process of deregulation has been slowed down due to the lack of sustained governmental efforts to complete the regulatory procedures for transgenic crops. In Venezuela, the technology to develop and greenhouse test the transgenic papaya has moved abreast with the Jamaica project, but the field testing of the transgenic papaya within the country was stopped very early on by actions by people opposed to transgenic products. The three cases are discussed in an effort to provide information on factors, other than technology, that can influence the adoption of a transgenic product.

Garraway, Eric See 1214

1167. **Goodbody, Ivan.** "The Ascidian Fauna of Port Royal, Jamaica I. Harbor and Mangrove Dwelling Species ." Bulletin of Marine Science 73.2 (2003): 457-76.**Refereed**

The near-shore environment of Port Royal, Jamaica and its adjacent mangrove ponds is described. Thirty-nine species of ascidian in 23 genera are listed as occurring in this area and brief notes and descriptions of their distribution and habitat preferences are provided. This fauna is compared with that occurring in other localities and it is concluded that the ascidian fauna of Port Royal is representative of faunal communities occurring in near-shore lagoonal environments in the Caribbean. The need to conserve Port Royal's biological heritage is addressed.

1168. **—-.** "Caribbean Ascidiacea." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 13-18.

1169. **—-.** "Kingston Harbour, Jamaica: An Overview." Bulletin of Marine Science 73.2 (2003): 249-55.**Refereed**
Kingston Harbour is often considered to be one of the finest natural harbours in the world. Comprised of two regions-the outer Harbour and the inner Harbour, the Kingston Harbour offers numerous opportunities in the areas of scientific research and development. This article provides a synopsis of the Kingston Harbour by topographical formation, its evolution and that of the surrounding areas that impacted its natural occurrences as well as those that have benefited from the Harbour. These uses of the harbour are highlighted in addition to the factors of pollution that have contributed to its degradation.

1170. **—-.** "Port Royal as a Focal Point for Marine Biodiversity in Jamaica." Jamaican Journal of Science and Technology 15 (2004): 37-53.**Refereed**
A specially protected area, The Port Royal and Palisadoes Protected Area, was gazetted in October 1998, to provide protection for both the biological and archaeological heritage which exists in the environs of Port Royal. A previous synthesis of the biological heritage, completed just prior to declaration of the protected area, is considered not to have captured all the historical information gathered by researchers at two marine laboratories, one at Port Henderson in the late 19th century and the other at Port Royal from 1955 to present. This literature is reviewed and it is shown that there is a species rich diversity of plants and animals in the marine environment around Port Royal. It is also shown that Port Royal is the *type locality* for at least 47 species of marine invertebrate animal. Jamaica is a signatory to the UN Convention on Biodiversity which binds the State to document and conserve its biological diversity. It is suggested that in keeping with this mandate an attempt should be made to create a National Database on Marine Biodiversity, bearing in mind that such a database might ultimately have to accommodate over one million entries.

Goodbody, Ivan See also 1111, 1172, 1736

1171. **Green, Sean O., and Dale F. Webber.** "The Effects of Varying Levels of Eutrophication on Phytoplankton and Seagrass (Thalassia Testudinum) Populations of the Southeast Coast of Jamaica." Bulletin of Marine Science 73.2 (2003): 443-56.**Refereed**
Being stationary, seagrass populations respond markedly and cumulatively to continued eutrophication over both time and space. Six seagrass meadows located within and near the eutrophic Kingston Harbour were investigated from October 1995 to June 1996 to determine the effects of increased eutrophication on seagrass population dynamics. The stations were sited at Fort Augusta, Old Coal Wharf (eutrophic, harbour sites), Hellshire coast (mesotrophic) and Port Royal Cays (oligotrophic). Aerial productivity, leaf turnover rate, leaf area, shoot density and total biomass of *Thalassia testudinum* were assessed during the period. In addition, the water quality at all the sites was monitored, using phytoplankton biomass as the primary index of water quality. These data were supplemented with water temperature, salinity, dissolved oxygen content, nutrients (nitrates + nitrites and phosphates), and light extinction coefficient data at these sites. Although there were no significant differences in labile nutrient data at six sites, the significant difference in phytoplankton biomass confirmed previous observations of a range of water qualities. Water quality ranged from the eutrophic Kingston Harbour (>2.0 mg m^{-3} chl a), to mesotrophic Hellshire Bays (0.57 ± 0.02 mg m^{-3} chl a), and the oligotrophic Port Royal Cays (0.21 ± 0.01 mg m^{-3} chl a). *Thalassia testudinum* populations exhibited an increase in leaf productivity rates (3.64 ± 0.39 g dwt m^{-2} d^{-1} at South East Cay to 5.46 ± 1.11 g dwt m^{-2} d^{-1} at Old Coal Wharf) and an increase in leaf area (11.64 ± 1.2 cm^2 at South East Cay to 22.85 ± 2.87 cm^2 at Fort Augusta) with increasing eutrophication. Conversely, there was a reduction in shoot density (917.25 ± 199.92 m^{-2} at South East Cay to 459.62 ± 65.35 m^{-2} at Old Coal Wharf) and total biomass (972.68 ± 88.39 g dwt m^{-2} at Rackhams Cay to 406.24 ± 62.16 g dwt m^{-2} at Fort Augusta) with increasing eutrophication stress. Comparisons with previous studies from ten years before indicated that *Thalassia testudinum* shoot biomas and density decreased at all times, while leaf productivity rates increased at oligotrophic sites and decreased at eutrophic sites during this period.

1172. **Harvey, Guy C. McN., Ivan Goodbody, and Karl A. Aiken.** "The Artisanal Thread Herring Fishery of Kingston Harbour: A Review." Bulletin of Marine Science 73.2 (2003): 421-32.**Refereed**
Eight species of pelagic clupeid fishes contribute to a small artisanal fishery in Kingston Harbour. This paper reviews studies of this fishery carried out over a period of three years between 1980-1983. The thread herring *Opisthonema oglinum* contributes the largest biomass of catch in this industry, which may have amounted to as much as 250 t yr^{-1} under favorable conditions. Evidence from a more recent study suggests that catches may have declined in recent years. Sustainability of the fishery is dependent on high levels of eutrophication supported by continued pollution of the harbour environment by domestic and industrial wastes. Consumers of these fish stocks are residents of poverty stricken areas of Kingston who are thus vulnerable to any contaminants entering the food chain from industrial or agricultural sources.

Hyslop, Eric J. See 1155, 1161, 1164, 1165, 1173, 1174, 1177, 1181, 1734

1173. **Lawson, Christine A., and Eric J. Hyslop**. "Selected Factors Affecting the Benthic Macroinvertebrates of the Lower Rio Minho, Clarendon." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 62.

1174. **Leiba, Nneka S., and Eric J. Hyslop**. "The Effects of a Salinity Gradient on Benthic Macroinvertebrate Communities in Spanish and Bull Bay Rivers and the Recovery of These Organisms From Major Flooding and Dredging Events." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 61.

1176. **Lowe, Donna, Jane E. Cohen, and Morag McDonald.** "Contour Hedgerows in an Agroforestry System: Effects on Crop Productivity and Soil Fertility." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 31-32.

1177. **Martin, Tamara R., Klaus W. Wolf, and Eric J. Hyslop**. "Habitat Partitioning, Diet and Radular Structure of Neritina Punctulata, Bussu; in Two Portland Rivers." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 63.

1178. **McDonald, Kerrine O., Dale F. Webber , and Mona K. Webber.** "Mangrove Forest Structure Under Varying Environmental Conditions." Bulletin of Marine Science 73.2 (2003): 491-506.**Refereed**
Vegetation assessments were carried out in three mangrove forests undergoing different levels of anthropogenic stress and varying environmental factors. These forests were in Hunts Bay, Fort Rocky Lagoon (part of the Port Royal mangroves on the south shore of Kingston Harbour), and Wreck Bay (Hellshire). The vegetation assessments included the determination of species composition, floristics, and leaf litter production of the mangrove trees. Selected environmental and biological conditions were also investigated at each site. The hypothesized gradient of environmental factors, eutrophication and disturbance was Hunts Bay > Fort Rocky Lagoon > Wreck Bay. With the exception of light on the forest floor, the soil and water column parameters were all significantly different among

sites, but the values did not always follow the expected environmental gradient. For example, nitrate/nitrite values were maximum at Wreck Bay (34.4 µM), followed by Hunts Bay (12.41 µM) and Fort Rocky Lagoon (10.0 µM), and phosphates ranked with maximum at Fort Rocky Lagoon (9.69 µM), then Hunts Bay (4.41 µM) and Wreck Bay (1.24 µM). Of the vegetation characteristics, only average leaf litter production and percentage cover were significantly different among sites, with a ranking similar to the hypothesis (i.e. Hunts Bay > Fort Rocky Lagoon > Wreck Bay). The most important factors influencing the distribution of productivity and percentage cover among forests were soil salinity, soil NO_3, especially the nitrate to phosphate ratio, soil moisture content and soil temperature with R^2 values of 0.77 for litter production and 0.64 for percentage cover. Other factors such as diameter at breast height and tree height were not significantly different among forests and showed a weak relationship with edaphic factors. Overall results indicated that the forests were very different with respect to physico-chemical and edaphic factors, and there was a clear gradient of eutrophication. However, the effect of anthropogenic stress and varying environmental conditions is most reliably demonstrated in the productivity and percentage cover of the forests.

1179. **Mendes, Judith M.** "Timing of Skeletal Band Formation in Montastraea Annularis: Relationship to Environmental and Endogenous Factors." Bulletin of Marine Science 75.3 (2004): 423-37.**Refereed**

The timing of density band formation, the seasonal growth rate, and the relationship of dense band formation to temperature, light, rainfall, growth rate, polyp tissue depth, and reproduction were determined in 15 Jamaican Montastraea annularis (Ellis and Solander, 1786) colonies by means of a long-term field study. The time and duration of high density (HD) band formation was from late August to early October. HD band formation occurred when monthly skeletal extension rates were lowest and gonads were largest. The strong correlations between HD band formation and skeletal extension rate, the inconsistent relationships between HD band formation and light intensity in the literature, and the absence of any significant correlation between HD band formation and polyp tissue depth, have led us to propose that density band formation is related primarily to changes in skeletal extension rate. Additionally, the strong correlations observed between gonad size and both HD band formation and skeletal extension support the premise that HD bands in M. annularis result from the diversion of resources to reproduction. A hypothesis of HD band formation based on the diversion of resources from growth to reproduction might also explain some of the variations in HD band formation time found in the literature as well as the absence of clear density bands in some species.

1180. **Mendes, Judith M., and Woodley D. Jeremy.** "Timing of Reproduction in Montastraea Annularis: Relationship to Environment." Marine Ecology Progress Series 227 (2002): 241-51.

The timing of reproduction was investigated in 15 colonies of Montastraea annularis located on the Port Royal Cays, Jamaica. Spawning occurred between days 6 and 8 after August's and/or September's full moon. In the 14 week prior to spawning, mean total gonad size increased from 0.30 ± 0.17 to 34. 38 ± 13.20% of the polyp cross-sectional area. Gonad size was significantly correlated with temperature and light intensity, but was correlated with photoperiod or rainfall. Spawning occurred in the month prior to the period of heaviest rainfall, when temperatures were at their maximum. A meta-analysis of spawning time and climate conditions at 19 other geographical locations also showed that spawning occurs in those periods without rainfall in which temperatures are warmest. The data presented here suggest that temperature is not the only environment variable controlling the annual timing of coral spawning. Rather, the time of coral spawning is controlled by a combination of temperature and rainfall.

Mendes, Judith M. See also 1713

1181. **Montaque, Keina K., and Eric J. Hyslop**. "The Effect of Urban and Agricultural Impacts on Macroinvertebrate Communities in the Upper Rio Minho." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 62-63.

1182. **Morgan, Lois A. T., and Jane E. Cohen.** "The Vegetative Propagation of Trees by Stem Cuttings for Use in Reforestation in Jamaica ." Science, Technology & Innovation: UWI Mona Leading the Nation. Mona, Jamaica: University of the West Indies, 2004. 25-27.

1183. **Murray, Anginette O., and Karl A. Aiken**. "Fishing Activities and Fishable Resources Exploited by Whitehouse Fishers, Westmoreland." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 44-45.

1185. **Persad, Gale, Russell R. Hopcroft , Mona K. Webber, and John C. Roff.** "Abundance, Biomass and Production of Ctenophores and Medusae Off Kingston, Jamaica." Bulletin of Marine Science 73.2 (2003): 379-96.**Refereed**

The species composition, abundance, biomass and production of ctenophores and medusae were determined fortnightly from September 1992 to December 1993 in eutrophic waters at the mouth of Kingston Harbour and mesotrophic waters off Lime Cay, Jamaica. The three species of ctenophores, *Bolinopsis vitrea*, *Beröe ovata* and *Ocyropsis crystallina*, occurred at both stations, together averaging 0.82 m^{-3} in the harbor and 0.60 m^{-3} at Lime Cay. The ten genera of medusae identified were common to both locations, but their abundances differed considerably, averaging 13.5 m^{-3} in the harbor and 3.0 m^{-3} at Lime Cay. In the harbor, *Eutima gracilis*, *Liriope tetraphylla*, *Ectopleura dumortieri*, *Cladonema* sp. and *Clytia* sp. all contributed variably to the community without clear seasonality. At Lime Cay, the medusae were equally dominated by *Clytia* sp. and *Liriope tetraphylla*. Community biomass was estimated using size-mass relationships established for each of the ctenophores, and the morphologically representative medusae: *Eutima gracils*, *Liriope tetraphylla* and *Clytia* sp. Ctenophore biomass averaged 663 mg wet-weight m^{-3} (18 J m^{-3}) at the mouth of Kingston Harbour and 363 mg m^{-3} (8.4 J m^{-3}) at Lime Cay, with *Bolinopsis vitrea* dominant at both sites. Biomass of medusae at the mouth of Kingston Harbour was 605 mg m^{-3} (94 J m^{-3}), dominated by *Eutima gracilis* and *Liriope tetraphylla*. The biomass of the medusae at Lime Cay was 25 mg m^{-3} (4.0 J m^{-3}), dominated solely by *Liriope tetraphylla*. Production was estimated using growth rates experimentally determined for *Bolinopsis vitrea, Eutima gracilis, Liriope tetraphylla*, and *Clytia* sp. *Bolinopsis vitrea* was the most productive ctenophore at both sampling stations, while for the medusae, *Eutima gracilis* dominated the production at the mouth of Kingston Harbour and *Liriope tetraphylla* dominated at Lime Cay. The greater proportion of the production of these gelatinous carnivore communities was attributable to the ctenophores in terms of wet-weight (52 and 77%), but not in terms of energetic production (15 and 32%). Together their annual production at the mouth of Kingston Harbour was 155 g m^{-3} yr^{-1} (13.9 kJ m^{-3} yr^{-1}), while that at Lime Cay was 63 g m^{-3} yr^{-1} (3.5 kJ m^{-3} yr^{-1}). Such production would require 36% or more of the combined copepod and larvacean production at these locations.

1186. **Ranston, Emma R., Rose-Marie A. Simmonds, and Dale F. Webber.** "The Phytoplankton Distribution in Kingston Harbour, Jamaica." Bulletin of Marine Science 73.2 (2003): 325-42.**Refereed**

The phytoplankton community composition, abundance and size-fractionated biomass (chlorophyll a) along with various physical and chemical parameters were assessed in Kingston Harbour, Jamaica. Monthly sampling was conducted at 31 stations, each with two sampling depths throughout the harbor between December 1993 and February 1995. The objectives of this study were to characterize the phytoplankton community of Kingston Harbour, to use this community structure to identify possible horizontal zonation and vertical stratification of the water mass in the harbor, and compare this with previous findings. Results suggested that the water mass of the harbor shows temporary vertical stratification during the wet seasons into a less saline surface layer and a more saline deep layer as defined by significant differences in the mean total phytoplankton biomass and cell abundance. Mean number of cells per liter in surface waters during the wet season ranged from $7x10^5$ to $10x10^7$ cells L^{-1}

compared to lower values for deep water that ranged from $3x10^5$ to $9.3x10^7$ cells L^{-1}. Values for mean total biomass in surface waters during the wet season ranged from 1.01-24.5 mg chl a m^{-3}, as compared to lower values in deeper water, which ranged from 0.56-22.1 mg chl a m^{-3}. Determination of stratification using the phytoplankton community was difficult to assess since most phytoplankton exhibit the tendency to sink through the water column while motile forms exhibit vertical migration between surface and deeper waters. Phytoplankton biomass was, however, very reliable for defining horizontal zones across the harbor. This was true for both surface and deep waters at each station in the harbor. Total and size fractionated chlorophyll a in surface waters indicated three zones; one being the surface water layers of the upper basin and the inner harbor, the second being the outer harbor, and the surface water layers of Hunts Bay formed the third zone. However, multiple range tests conducted on deep water chlorophyll a data defined four zones in the harbor: the deep water layers of the upper basin, the inner harbor, the outer harbor, and Hunts Bay, respectively. Dissolved oxygen and NO_3-N+NO_2-N concentrations supported the horizontal zonation pattern defined by the phytoplankton community.

1187. **Ranston, Emma R., and Dale F. Webber.** "Phytoplankton Distribution in a Highly Eutrophic Estuarine Bay, Hunts Bay, Kingston Harbour, Jamaica ." Bulletin of Marine Science 73.2 (2003): 307-24.**Refereed**

The phytoplankton community composition, abundance and size fractionated biomass (chlorophyll a) along with various physical, chemical and biological parameters were assessed monthly from December 1993 to February 1995 at two sampling depths at each of nine stations throughout Hunts Bay, Jamaica. The objective of the study was to investigate the distribution of the phytoplankton community within Hunts Bay in order to identify the major sources of stratification and ecological zones of Hunts Bay. Results indicated highly significant differences between surface and deep waters in physical, chemical and biological parameters, particularly during the wet season. This suggested a stratification, or vertical zonation of the Bay into two layers, an upper 0.5 m deep, fresh-brackish water (0-18 salinity) layer, and a deeper 0.5-2.5 m, more saline (24-30) layer. Horizontal variation in physical variables from station to station was low; thus, these variables were of little value in designating horizontal zonation of the Bay. Chemical and biological variables, however, were highly variable and along with community analyses, were quite valuable in designating the horizontal zones of the surface and deep-water layers of the Bay into four general regions: the North Bay, Middle Bay, South Bay and Outer Bay. Both surface and deep-water layers had the same zonation pattern and each zone (except for the Outer Bay) was dependent on, and influenced by, the nearest fresh water inflows. The Outer Bay was influenced more by close proximity to the saline water of Kingston Harbour. At North Bay stations, results of nutrient concentrations (PO_4 = 0.73 μM), phytoplankton abundance (7.5×10^7 cells L^{-1}), and biomass (18.69 mg chl a m^{-3}) were all significantly (MANOVA, $P < 0.0001$, df = 9) higher compared to the remaining stations of the bay. Therefore, the North Bay was classified as the most eutrophic area of Hunts Bay. There was an eutrophication gradient in the other zones from North to South Bay, followed by the Middle then Outer Bays. This confirms that Sandy Gully and the Duhaney River are the major sources of eutrophication to the Hunts Bay. The Rio Cobre may have significant effect on Hunts Bay; however, the volume of fresh water from this source dilutes the nutrient concentrations and flushes pollutants out of the Bay.

1188. **Robinson, Dwight E., C. Henry, and Ajai Mansingh.** "Ecotoxicity Studies in Jamaican Environment II: Toxicity, Bioaccumulation, Elimination and Tissue Partitioning of Dieldrin by the Shrimp, *Macrobrachium Faustinum*." Environmental Technology 23.11 (2002): 1275-84.**Refereed**

1189. **—-.** "Toxicity, Bioaccumulation and Tissue Partitioning of Dieldrin by the Shrimp, Macrobrachium Faustinum De Sassure, in Fresh and Brackish Waters of Jamaica." Environmental Technology 23: 1275-84.**Refereed**

The 2-week no observed effect (NOEC) and lowest observed effect (LOEC) concentrations of dieldrin were determined for macrobrachium faustinum de sasure in fresh and brackish waters. $LOEC_{1,\ 10,\ 50,\ 95}$ values in fresh water were 0.001, 0.003, 0.011 and 0.058 μg 1^{-1}, respectively, and in brackish water, 0.00006, 0.00027, 0.00165,

and 0.0172 µg 1^{-1}, respectively. The 96-hr LC_{10}, LC_{50} and LC_{95} values were 0.029, 0.123 and 0.771 µg 1^{-1}, respectively. It is proposed that NOEC and LOEC be redefined to take into account the percentage of individuals affected, the severity of symptoms and the recovery of poisoned individuals. Two new terms are proposed - Median Observable Effect Concentration (MOEC) for pronounced toxic symptoms in most individuals but mortality in <50%, and Pronounced Observed Effect Concentration (POEC), which inflicts mortality in >50% individuals. Bioaccumulation of dieldrin by M. faustinum from surrounding fresh and brackish waters were rapid and fairly uniform for the first 48 h when the bioconcentration equilibrium (14.4 ± 0.42 ng g^{-1} at 0.001 µg 1^{-1} and 42.5 ± 1.72 ng g^{-1} at 0.01φg 1^{-1}) was achieved. Relative partitioning of residues (ng g^{-1} wet wt.), after 24 h exposure to 0.001 µg 1^{-1} of dieldrin in fresh water, in the different tissues was hepatopancreas > gonads > gills > large claws > muscle and exoskeleton. Shrimp which had accumulated 10.5 ± 0.52 ng g^{-1} dieldrin in fresh and brackish water, eliminated only about 52% of the residues after eight days in uncontaminated water.

Robinson, Dwight E. See also 1788

1190. **Robinson, Ralph D.** "Epidemiology and Transmission of Parasitic Infections in Humans and Animals in Jamaica and the Caribbean Region." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 20-21.

1191. **—-.** "What to Look for Under the Sea." A Tapestry of Jamaica. Editor Linda Gambrill. Kingston, Jamaica : Creative Communications Inc., 2003. 124-26.
The author gives the detailed activities and existing life forms occurring under water, especially in environments close to and within the corals. The wonders and appearances of organisms extending from microorganisms to corals to larger and more fearsome-looking specimens such as sharks are identified in this report. The report is based on what is observed from exploration of Jamaica's underwater gardens. The coexistence of specimens, the niche of corals in hosting organisms and the feeding habits of some organisms are highlighted.

Robinson, Ralph See also 1175, 1207, 1696

1192. **Shirley, Sasha A., and Mark A. Thomas**. "The Effect of Cannasol and Oxidative Status, on the Expression of Angiogenic Modulators in Embrionic and Adult Tissues of Fish." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 81-82.

1193. **Tennant, Paula F.** "Agricultural Biotechnology in 2001: A Review." Faculty of Pure and Applied Sciences Newsletter 14.4 (2002): 10.

1194. **—-.** "Agricultural Biotechnology: Overview of Public Perception ." The Gleaner (2003): B6.

1195. **—-.** "Breeding Resistance Against the Papaya Ringspot Virus Disease of Papaya Using Tools of Agricultural Biotechnology." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 6-8.

1197. **—-.** "Crops of Agricultural Biotechnology: Just the Round Up Ready Soybean?" The Gleaner (May 2 2002): D8.

1198. **—-.** "Crops of Agricultural Biotechnology (Part 2)." The Gleaner (Feb 6 2003): D12.

1199. **—-.** "Crops of Agricultural Biotechnology: Safety Questions and Answers." The Gleaner . (January 30, 2003): B4.

1200. **Tennant, Paula F., Mohammed H. Ahmad , and Dennis Gonsalves.** "Field Resistance of Coat Protein Transgenic Papaya to Papaya Ringspot Virus in Jamaica ." Plant Disease 89.8 (2005): 841-47.**Refereed**

Transgenic papayas (Carica papaya) containing translatable coat protein (CPT) or nontranslatable coat protein (CPNT) gene constructs were evaluated over two generations for field resistance to Papaya ringspot virus in a commercial papaya growing area in Jamaica. Reactions of R-0 CPT transgenic lines included no symptoms and mild or severe leaf and fruit symptoms. All three reactions were observed in one line and among different lines. Trees of Most CPNT lines exhibited severe symptoms of infection, and some also showed mild symptoms. R-1 offspring showed reactions previously observed with parental R-0 trees; however, reactions not previously observed or a lower incidence of the reaction were also obtained. The transgenic lines appear to possess virus disease resistance that can be manipulated in subsequent generations for the development of a product with acceptable commercial performance.

1201. **—-.** "Transformation of Carica Papaya L. With Virus Coat Protein Gene for Studies on Resistance to Papaya Ringspot Virus From Jamaica." Tropical Agriculture (Trinidad) 79.2 (2002): 105-13.

Translatable and non-translatable versions of the coat protein gene (CO) of a Papaya ringspot virus (PRSV) isolate from Jamaica were used to transform papaya (Carica papaya L.) embryos by microprojectile bombardment. One hundred and fifty transgenic calli were obtained, of which 39 were regenerated and established in the greenhouse. Coat protein was detected (75%) by polymerase chain reaction; varying levels of CP ribonucleic acid (RNA) transcript and expression protein were detected by Northern analysis and enzyme-linked immunosorbent assays, respectively. R_0 and R_1 plants were challenged under greenhouse conditions with the homologous PRSV isolate from which the transgene was derived and heterologous isolates from other locations across Jamaica. R_0 plants carrying the translatable CP were highly resistant and more resistant (78%) to inoculation with the homologous PRSV than lines transformed with the non-translatable CP (10%). However, 15% of the latter lines exhibited a recovery phenotype whereby plants appeared to out-grow systemic infection. In the following generation, R_1 plants, carrying either version of the CP, exhibited strong resistance but lower levels of resistance (6-46%) to heterologous PRSV isolates. The results suggest that high, broad-spectrum resistance against PRSV isolates across Jamaica should be attainable in subsequent generations by conventional breeding within and between selected transgenic lines carrying translatable and non-translatable versions of the virus CP gene.

1202. **Tennant Paula F., M. T. Souza, Dennis Gonsalves, M. M. Fitch, R. M. Manshardt, and J. L. Slightom.** "Line 63-1: A New Virus-Resistant Transgenic Papaya ." HortScience 40.4 (2005): 1196-99 .

The disease resistance of a transgenic line expressing the coat protein (CP) gene of the mild strain of the papaya ringspot virus (PRSV) from Hawaii was further analyzed against PRSV isolates from Hawaii and other geographical regions. Line 63-1 originated from the same transformation experiment that resulted in line 55-1 from which the transgenic commercial cultivars, 'Rainbow' and 'SunUp', were derived. Plants of line 63-1 used in this study consisted of a population from a self pollinated R-o bisexual plant. ELISA and PCR tests provided evidence that there are at least two segregating CP loci. To allow for comparison with reactions of the previously reported line 55-1, virus isolates from Hawaii, Brazil, Thailand, and Jamaica were used to challenge seedlings of 63-1. Unlike line 55-1, a significant percentage of inoculated transgenic plants were susceptible to isolates from Hawaii. However, a proportion of plants were resistant to the non-Hawaiian isolates. In contrast, previous work showed that all plants of the hemizygous line 55-1 were susceptible to PRSV isolates from Brazil, Thailand, and Jamaica. Line 63-1,

therefore, presents Hawaii with PRSV-resistant transgenic germplasm that could be used as a source of transgenes for resistance to PRSV isolates within and outside of Hawaii.

Tennant, Paula F. See also 615, 616, 617, 1069, 1153, 1158, 1166, 1293

1203. **Thompson, Heather P, and Dale F. Webber.** "The Sand Dune Ecology of the Palisadoes, Kingston Harbour, Jamaica." Bulletin of Marine Science 73.2 (2003): 507-20.**Refereed**
The Palisadoes is a 16 km tombolo forming the south border of the Kingston Harbour, characterized by dune vegetation on the southern windward side and mangrove thickets on the northern leeward side. The coastal vegetation there was investigated and characterized using four transects. Research was limited to the windward side where the little studied sand dune community exists. Vegetation attributes investigated along the transects were species composition, height, percentage vegetation cover, vegetation life form and leaf size class. Environmental parameters and variables assessed were relative humidity, air temperature, wind velocity, light intensity and salt spray. Edaphic parameters assessed were soil temperature, soil moisture, soil salinity, soil nutrient content and organic content. The sand dune community of the Palisadoes exhibits zonation indicated by change in percentage cover, height and species composition. The three zones identified (strand beach, strand dune and strand thorn-scrub) are characterized by different dominant species assemblages. Strand beach zone was characterized by a *Sporobolus sp*., *Gomphrena sp*. and *Sesuvium sp*. assemblage, the narrow strand dune zone by replacement with a *Capparis* and *Calliandra* assemblage and the strand thorn-scrub by further addition of a dominant *Acacia-cacti* assemblage. The presence of particular zones in each transect was influenced by different climatic and edaphic conditions with salt spray, soil moisture, organic content, and soil water content being important factors. Two endemic species were identified. *Calliandra pilosa* and *Opunitia jamaicensis*, compared with five in a 1953 report. Recent road realignment and widening/resurfacing development as well as environmental theft have increased the pressure on the rare and endemic species found in this sand dune community. Continued vegetation loss could impact on dune stability and integrity of Palisadoes and associated communities within Kingston Harbour.

1204. **Townsend, Sean E., Ava M. Maxam, and Dale F. Webber**. "The Dispersal of Phytoplankton Along the Coastal Embayments, Hellshire Coastline, St. Catherine, Jamaica." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 39-40.

1205. **Vaidya, Kisan R., and Shobita Jain.** "Genetic Variation in Amaranth Landraces From India." Journal of Genetics and Breeding 56 (2002): 193-204.**Refereed**

1206. **Vogel, Peter A.** "West Nile Virus Has Arrived in Jamaica - Birds Likely to Be the Primary Victims." Broadsheet Birdlife Jamaica 79 (2002): 10-14.

Vogel, Peter A. See also 1162

1207. **Waugh, Cecelia A., John F. Lindo, Collette Cunningham-Myrie, M. Eberhard, and Ralph D. Robinson**. "Angiostrongylus Infections in Rats and Snails in Jamaica." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 41-42.

1208. **Webber, Dale F., and Peter Wilson Kelly.** "Characterization of Sources of Organic Pollution to Kingston Harbour, the Extent of Their Influence and Some Rehabilitation Recommendations ." Bulletin of Marine Science 73.2 (2003): 257-71.**Refereed**

Sources of organic pollution to Kingston Harbour were assessed by monthly sampling at 22 rivers, gullies and discharge pipes emptying into the harbor between August 1996 and July 1997. These sources were divided into point and non-point sources and coupled with underground water and industrial flow assessed from 1992 and 1996 data. Organic pollutions signatures were coliform bacteria, total suspended solids (TSS), bio-chemical oxygen demand (BOD), nitrite + nitrate nitrogen and phosphate phosporous. Sewage is by far the most important contributor of organic pollution to Kingston Harbour, regardless of the signature used. The continuity and concentrations at the outfall of the Greenwich and Western sewage treatment plants render these two areas as the most significant point sources of pollution to the harbor. River flow is the second largest point source of organic pollution to the harbor; the degree of its contribution depending on rainfall since only at high flow does it make major contributions. Poor watershed management, extensive agriculture inputs from few, but large industries, large and growing residential areas and the length of the river creates problems. When the rivers are at low flow, industries and groundwater become major non-point sources of different pollutants. During periods of high water flow the gullies are small, but significant non-point sources of most pollutants. Fifty-five to 70% of the contributions of total suspended solid (TSS) is associated with sewage, while 23-30% is associated with a range of industries. Under high flow conditions, <20% of TSS is associated with the outflow from rivers and gullies, while under low flow conditions, rivers and gullies make no meaningful contribution. Of the contributions of biochemical oxygen demand (BOD), 29-50% is associated with sewage, while 24-40% with industries. Under high flow conditions, 40% of BOD is associated with river outflow, while under low flow conditions, rivers make no meaningful contribution. Of the contributions of nitrate nitrogen, 55-65% is associated with sewage, approximately 30% is associated with ground water and <20% associated with flow from rivers and gullies under high flow conditions. River and gully flow under low flow conditions make no meaningful contribution. Of the contributions of phosphate phosphorous, 75-90% is associated with sewage and <20% associated with high flow conditions from river and gully outflow. At low flow, industries and ground water make no meaningful phosphate phosphorous contribution. Having identified, quantified and ranked the sources of organic pollution to Kingston Harbor, recommendations are suggested for the improvement of the water quality. Among these are a reduction and/or cessation of sewage discharges to the harbor coupled with the use of a predictive hydrodynamic three-dimensional model and an ongoing monitoring program.

1209. **Webber, Dale F., Mona K. Webber, and Doreen D. Williams.** "The Relative Importance of Meteorological Events, Tidal Activity and Bathymetry to Circulation and Mixing in Kingston Harbour, Jamaica." Bulletin of Marine Science 73.2 (2003): 273-89.**Refereed**

The objective of the study was to determine the influence of meteorological events (rainfall and wind) as well as tides and bathymetry on the circulation patterns of an enclosed embayment, Kingston Harbour, Jamaica. Current velocity, water temperature and water salinity were assessed at 20 stations within the harbor between December 1993 and February 1995. Meteorological events such as rainfall, wind velocity and tidal periocity and amplitude were determined in association with routine sampling conducted at the 20 harbor stations. Results indicated that the harbor behaves in a complex manner and is best presented in sectors (zones). The outer harbor has estuarine characteristics and appears to be driven primarily by density/salinity gradients. After heavy rainfall (<65 mm), there is an upper layer (0-5 m deep) of low-salinity water (31-35) flowing quickly (14 cm s^{-1}) out of the harbor, while below 5 m, more saline water (35-36) flows more slowly (~ 3 cm s^{-1}) into the harbor. A characteristic of the outer harbor is a deep, but narrow shipping channel where fast currents (max = 15 cm s^{-1}) facilitate constant water renewal, thus high water quality. Inner harbor circulation is most affected by tides, but the area also comes under the influence of low salinity water flowing from Hunts Bay as well as high winds from the southeast. Greatest water movement in the inner harbor (18 cm s^{-1}) was achieved when high winds combined with ebb tidal period. The upper basin is primarily affected by winds, which induce horizontal and vertical gyres in the area with little net horizontal movement. Surprisingly, the fastest currents (24 cm s^{-1}) were recorded in the eastern section of the upper

basin; however, this was under conditions of high wind (>4 m s^{-1}), high rainfall (>65 mm) and a flooding tidal cycle, which produced the greatest movement throughout the harbor.

Webber, Dale F. See also 1156, 1171, 1178, 1186, 1187, 1203, 1204, 1211

1210. **Webber, Mona K.** "Mangrove Lagoons, Zooplankton, Anthropogenic Stress." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 1-5.

The author summarizes research which identifies the function of mangroves occurring in costal systems in Jamaica. The water quality in mangals (mangrove dominated areas) is inferred as a means of reversing or reducing degradation in them. The use of anthropogenic stress in mangrove lagoons by using indicators such as zooplankton species provides a basis for the investigations done and reported.

1211. **Webber, Mona K., Dale F. Webber, Emma R. Ranston, Francine N. Dunbar, and Rose-Marie A. Simmonds.** "Changes in Water Quality and Plankton of Kingston Harbour, Jamaica, After 20 Years of Continued Eutrophication ." Bulletin of Marine Science 73.2 (2003): 361-78.**Refereed**

Organic pollution of Kingston Harbour has continued unabated since the first set of comprehensive studies (conducted in the 1970s), which indicated that the area was under stress. The major objective of the most recent study (concluded in the 1990s) was, therefore, to investigate the changes in the water quality and planktonic communities of Kingston Harbour after 20 yrs of continuous nutrient loading. To this end, the abundance, species composition and community structure of the planktonic communities were examined along with water column temperature, salinity, dissolved oxygen, NO_2-N+NO_3- N and PO_4-P concentrations between December 1993 and February 1995 (inclusive). The indices used were similar to those used in the previous characterization and only stations common to both studies and sampled over the entire annual cycle were used for the comparison. All physico-chemical parameters examined (with the exception of light extinction and phosphates) were significantly different between the two studies especially the nitrite + nitrate concentration. Maximum labile NO_2-N + NO_3-N concentration of 45.3 μM and maximum PO_4-P concentration of 0.95 μM were recorded in the 1994 study compared with values in the 1972 data of 2.02 μM and 1.49 μM, respectively. The increased eutrophic state was indicated by the significantly higher values for mean phytoplankton abundance throughout the harbour compared to 1973 findings. Mean phytoplankton abundance (29 x 10^7 cells L^{-1}) for the entire harbor was higher than the previous maximum (5 x 10^7 cells L^{-1}). Phytoplankton biomass values were also significantly higher (maximum average = 26.1 mg m^{-3} chlorophyll a) compared to previous findings (maximum average = 16.82 mg m^{-3}) and followed distribution patterns similar to abundance values. The impact of continued eutrophication is further evidenced in a shift in phytoplankton community composition during the 20 yrs from dominance of smaller cells and diatoms to a dominance of larger cells and dinoflagellates. In 1994, mean total numbers of zooplankton for the area were significantly higher and ranged from 3347 animals m^{-3} in Hunts Bay to 91,905 animals m^{-3} at station 8, located at the end of the airport runway. This maximum value was 3.6 times the maximum reported in the 1972 study (25,248 animals m^{-3}), but it was obtained at the same station. In fact, for all zooplankton indices except *Paracalanus spp*. and *Lucifer faxoni* numbers, the values in the present study were all on average between 5.5-1.2 times greater than in 1972. They also followed a similar pattern of distribution. Obvious differences in species distribution were seen in *Temora turbinata* numbers, which in the present study were far more important (on average 52 times greater) than in the earlier study, and in *Penilia avirostris*, which dominated the harbor in the 1972 study. Despite these differences, community diversity between the two periods followed a similar pattern. Therefore, while parameters indicate a worsening of conditions in Kingston Harbour, the pattern of distribution is very similar, suggesting that the areas experiencing the greatest stress remain the same.

Webber, Mona K. See also 1163, 1178,1185, 1209, 1211

1212. **Williams, J., H. J. Fagan, and Phyllis L. Coates-Beckford.** "Aspects of Banana Cultivation and Root Health in the Windward Islands." Tropical Agriculture (Trinidad) 81.2 (2004): 87-94.
A survey was conducted in the Windward Islands of Dominica, St. Lucia, and St. Vincent to obtain information on the characteristics of banana farms, cultural practices adopted, the thriftiness of the crops, the health of the roots, and the abundance of root-parasitic nematodes and fungi. Most farms appeared to be thrifty, irrespective of farm size and duration under cultivation, and apparently received proper crop care. Leaf spot disease control, weed control, and the conditions of the drains needed improvement on some farms. Farmers perceived the unavailability of chemicals, leaf spot disease, and drought as the main production constraints. Other perceived constraints were pest, heavy rainfall, soil texture, slope of land, and lack of labour. Necrotic roots parasitized by micro-organisms occurred on all farms. The most abundant root-parasitic nematode was *Radopholus similis* and the most frequently detected fungus was *Fusarium oxysporum* f. sp. *cubense*. All species of root-inhabiting nematodes and fungi were detected at high and low altitudes. *Helicotylenchus* sp. and *Trichoderma* spp occurred more frequently at altitudes less than 229 m above sea level (asl) than at higher altitudes and the percentage occurrence of *Fusarium* spp and the degree of root necrosis were significantly higher in farms at altitudes higher than 229 m asl than at the lower altitudes. The nematode population densities in roots were positively correlated with the degree of necrosis in roots of suckers at high altitudes in St. Lucia. The information gained from these studies will be useful in the development of integrated control measures.

1213. **Wilson, Byron S.** "Conservation of Jamaica's Terrestrial Fauna: Endemic Reptiles and Amphibians." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 19.

1214. **Wolf, Klaus W., Catherine Murphy, Walton A. Reid, and Eric Garraway**. "An Optical Illusion in Scanning Electron Micrographs on the Chorion of the Tiger Moth *Are Druryui* (Lepidoptera: Arctiidae)." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003.

Department of Mathematics and Computer Sciences

1215. **Appleby, J., and Alexander E. Rodkina.** "Asymptotic Stability of Polynomial Stochastic Delay Differential Equations With Damped Perturbations." Functional Differential Equations 12.1-2 (2005): 35-60.**Refereed**

1216. **Atkinson, M. D., and Timothy S. Stitt.** "Restricted Permutations and the Wreath Product." Discrete Mathematics 259 (2002): 19-36. **Refereed**

Restricted permutations are those constrained by having to avoid subsequences ordered in various prescribed ways. A closed set is a set of permutations all satisfying a given basis set of restrictions. A wreath product construction is introduced and it is shown that this construction gives rise to a number of useful techniques for deciding the finite basis question and solving the enumeration problem. Several applications of these techniques are given.

1217. **Bartschat, K., M. P. Scott, P. G. Burke, Timothy S. Stitt, N. S. Scott, A. M. Grum-Grzhimailo, S. Riordan, G. Ver Steeg, and S. I. Strakhova.** "Convergence of Energy-Differential Ionization Cross Sections Obtained From a T-Matrix Approach With R-Matrix Wave Functions." Physical Review A 65.6 (2002): 062715-1 - 062715-6.

The T-matrix approach as formulated by Pindzola et al. [Phys. Rev. A 62, 062718 (2000)] for calculating the single-differential ionization cross section (SDCD) has been further investigated. Using the "intermediate-energy R-matrix method" to obtain the full scattering wave function needed in the matrix element, we performed several case studies for the Temkin-Poet-wave model of e-H scattering to study the dependence of the results on the box radius and the number of states included. Despite encouraging results before reaching convergence, we conclude that the method will ultimately not yield the correct form of the SDCS but instead will still suffer from unphysical oscillations.

1218. **Campbell, Arnett B., and Daniel N. Coore**. "Towards a Paradigm for Implementing Divide and Conquer Algorithms on an Amorphous Computer." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Lancashire Robert J. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 92.

1219. **Coore, Daniel N.** "Abstractions for Directing Self-Organising Patterns." Unconventional Programming Paradigms: International Workshop UPP 2004. Editors J. P. Banâtre, P. Fradet, J. L. Giavitto, and O. Michel. Berlin: Springer Verlag, 2005. 110-20.

We present an abstraction for pattern formation, called pattern networks, which are suitable for constructing complex patterns from simpler ones in the amorphous computing environment. This work builds upon previous efforts that focused on creating suitable system-level abstractions for engineering the emergence of agent-level interactions. Our pattern networks are built up from combinations of these system-level abstractions, and may be combined to form bigger pattern networks. We demonstrate the power of this abstraction by illustrating how a few complex patterns could be generated by a combination of approximately defined pattern networks. We conclude with a discussion of the challenges involved in parameterising these abstractions, and in defining higher order versions of them.

1220. —-. "Amorphous Computing." Science, Technology and Innovation: UWI Mona Leading the Nation: Mona, Jamaica: University of the West Indies, Mona, 2004.

The author looks at the challenges of computing elements and the use of computing techniques that will enable the control of the global behaviour of such large, inter-connected systems. Hence, the research encompasses the use of amorphous computing systems as a platform for testing different approaches for programming these systems.

1221. **—-.** "Introduction to Amorphous Computing." Unconventional Programming Paradigms: International Workshop UPP 2004. Editors J. P. Banâtre, P. Fradet, J. L. Giavitto, and O. Michel. Berlin: Springer Verlag, 2005. 99-109.
The study of amorphous computing aims to identify useful programming methodologies that will enable us to engineer the emergent behaviour of a myriad, locally interacting computer elements (agents). We anticipate that in order to keep such massively distributed systems cheap, the elements must be bulk manufactured. Therefore, we must use a conservative model in which the agents run asynchronously, are interconnected in unknown and possibly time-varying ways, communicate only locally, and are identically programmed. We present a description of this model, and some of the results that have been obtained with it, particularly in the areas of pattern formation and the development of programming languages that are specifically suited to our model. Finally, we briefly describe some of the ongoing efforts in amorphous computing, and we present some of the interesting and important problems that still remain open in amorphous computing.

1222. **—-.** "Towards a Universal Language for Amorphous Computing." NECSI International Conference on Complex Systems (ICCS 2004). 2004.
We identify several "building-block" activities for the amorphous computing model that can be abstracted and combined in various ways to create interesting patterns of non-local behaviour. We support our discussion by demonstrating how some of the work already done in amorphous computing could have been accomplished through suitable combinations of these building blocks.

1223. **Coore, Daniel N., Dean D. Holness, Richard Lawson, and Howard P. Nation**. "Design and Implementation of a Simulator for an Amorphous Computing Environment." Presneted at IEEE SoutheastCon 2003: April 4-6 (2003)), 2003.
http://www.swiss.ai.mit.edu/projects/amorphous/jsim/sim/GrayScott.html.
In an amorphous computing environment, myriads of simple computing elements interact locally, under the control of a common program, to produce some prespecified coherent behaviour. The goal of amorphous computing is to find programming paradigms that will enable us to write such programs effectively. We have designed and built an amorphous computing simulator that is capable of simulating 100,000 processors running a small program that involves all processes reachable from a designated starting processor. The simulator is modularised, so that inter-processor communications, controls and outputs are pluggable. The simulator also implements a client-server architecture that allows multiple remote users to collaboratively access a single instance of a simulation.

1224. **Coore, Daniel N., Paul S. Ramphal, and Michael P. Craven.** "The Cardiac Surgery Training Simulator." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 123-28.
The research looks at the use of simulators to overcome the challenge of training surgeons. Although other computer-generated virtual reality models are mentioned the animated porcine (pig's) heart under the direction of a computer program using electro-mechanical pump system is reported to be the most useful. The advantages and disadvantages of the use of this simulator are also sited.

Coore, Daniel N. See also 940, 1218, 1225, 1226, 1229, 1231, 1252

1225. **Craven, Michael P., Somara M. Newman , Maurice Fletcher, Brian C. Silvera, Daniel N. Coore, Neil F. Forbes , and Paul S. Ramphal.** "Cardiac Training Simulator Using Pump With Electronic Pressure Sensor to Trigger Ventricular Fibrillation." Proceedings of IEEE SoutheastCon (2003): 12-17.
(Title also in PubMed - A high fidelity tissue-based cardiac surgical similar for European Journal of Cardiothorac Surgery 27 (2005) 910-916)

Cardiac surgery training in a realistic surgical environment is assisted by a simulator based on an electromechanical pneumatic pump with associated control and display software. In this paper we describe a feedback mechanism for controlling the beating mode of the simulator by means of a electronic pressure sensor incorporated into the pneumatic pump. The sensor was incorporated into an electronic data acquisition board and was used to trigger a ventricular fibrillation (cardiac arrest) mode in the pump control system when the heart attached to the pump is handled by the trainee surgeon, as is typically experienced in a real operation. The mode change also results in changes to simulated vital signs including ECG and pressure traces which are displayed on a monitor within the surgical training environment. Software is described which was designed to drive the pump at various beating rates, display the vital signs, and respond to pressure sensor measurements.
The work described is the continuation of a collaboration between the University Hospital of the West Indies (UHWI), the School of Engineering at the University of Technology, Jamaica (UTech), and the Department of Mathematics & Computer Science at the University of the West Indies (UWI), which has the aim of producing a computer controlled device and training system capable of simulating the range of intra-operative cardiac behaviours typically found in heart surgery, in order to improve training of resident surgeons.

1226. **Craven, Michael P., Paul S. Ramphal, Daniel N. Coore, Brian C. Silvera, Maurice Fletcher, and Somara M. Newman**. "Design of an Electromechanical Pump System for Training in Beating Heart Cardiac Surgery." Proceedings of IEEE SoutheastCon 2002: (Columbia: 5-7 April, 2002), 2002.

1227. **Curtis, Mervyn K., M. Kelly, and Michael P. Craven**. Fuzzy Sets and Cricket Batting. Recent Advances in Simulation, Computational Methods and Soft Computing, Electrical and Computer Engineering Series. WSEAS Press, 2002. 203-07

1228. **Dennis, Errol H., and Ezra K. Mugisa** . "Reusable Software Architecture for Intranet Based Accounting Information System." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 32-33.
This work patterns the techniques used in other engineering disciplines in developing complete systems from reusable components. It looks at the development of a reusable blue print or reusable software architecture (RSA) that will guide programmers of software engineers in assembling different systems from reusable components.
The benefits of reusability in software systems have been well recognised and are expected to include significant improvement in productivity and increased software quality. Progress in this area is however, still unsatisfactory [Smolárová and Navrát 1997]. There are technical and non-technical reasons hindering reuse technology but the greater successes are observed with the reuse of components that tend to be domain specific and large [Biggerstaff 1997]. Our strategy therefore, is to build on the techniques that have proven to be successful by limiting the study to a specific domain and abstracting away unnecessary smaller sub-component details.
The scope of this work will be limited to the development of a RSA for an intranet based accounting information system (AIS). It involves the development of a RSA that is adaptable to different accounting needs by changing the composition and properties of the architecture. Included in the work is a formal specification of the AIS, an analysis of the RSA; and an appropriate notation for architectural representation.

1229. **Forbes, Neil F., and Daniel N. Coore** . "Implementation of a Software Controlled Cardiac Surgery Trainer." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 93.

1230. **Mansingh, Gunjan, and Lila Rao**. "Determining the User Characteristics for the Choice of Internet Banking." Presented at INFORMS 2005 Annual Meeting : (San Francisco, U.S.A.: Nov 13th -16th 2005), 2005.

1231. **Nation, Howard P., and Daniel N. Coore**. "Analysis of the Non-Persistent Carrier Sensing Multiple Access Protocol in an Amorphous Environment." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 92.

1232. **Rodkina, Alexander E.** "On Asymptotic Normality of Generalized Discrete Robbins-Monro Approximation Procedures." Proceedings of the International Conference Modern Problems of Functional Analysis and Differential Equations: June 30 - July 4, 2003)Voronezh, Russia, 2003. 26-44 .

1233. **—-.** "On Asymptotic Stability of Nonlinear Stochastic Systems With Delay." Cubo: A Mathematical Journal 07.N1 (2005): 23-42.
We consider the system of stochastic differential equations with delay and with nonautonomous nonlinear main part
dxi(t) =
n Xk =1 pki(t)xμk
k (t) + fi t, [X]t-h
t dt + i t, [X]t-h
t dwt ,
i = 1, . . . , n, X(s) = (s), s 0. (1)
Here h 0, [X]t- h
t (s) = X(s), when s 2 [t - h, t], t > h, [X]t-h
t (s) = (s), when
s 2 [-1, 0], (s) is a given initial process, X = (x1, x2, . . . , xn)T , μi > 1 are rational numbers with odd numerators and denominators, wt is a Wiener process.
For different types of delays in coefficients fi t, [X]t-h
t and i t, [X]t-h
t we prove almost sure asymptotic stability of a trivial solution to the system (1) when (s) 0.

1234. **—-**. "On Stability of Stochastic Non-Autonomous Nonlinear Systems With Delay." Proceedings of the International Conference on Differential Equations Equadiff 2003: August 22-26, 2003)Hasselt-Belgium, 2003. 1125-27.

1235. **—-.** "On Stabilization of Hybrid Stochastic Equations." Dynamics of Continuous, Discrete and Impulsive Systems. Series A: Mathematical Analysis 10.1-3 (2003): 117-26.

1236. **Rodkina, Alexander E., and G. Berkolaiko**. "On Asymptotic Behaviour of Solutions to Linear Discrete Stochastic Equation." Proceedings of the International Conference 2004 Dynamical Systems and Applications: 5-10 July 2004)Antalya, Turkey, 2004. 614-23.

1237. **Rodkina, Alexander E., and Xuerong Mao.** "On Asymptotic Behaviour of Solutions to Nonlinear Difference Equation With Nonmartingale Type Noise." Advance in Mathematics Research. Vol. 6. Nova science , 2004. 101-26.**Refereed**

1238. **Rodkina, Alexander E., and Nosov V.** "On Stability of Discrete Kiefer-Wolfowitz Procedures." Functional Differential Equations 9.3-4 (2002): 577-93.**Refereed**

1239. **—-.** "On Stability of Some Nonlinear Scalar Differential Equations." Dynamic Systems and Applications 12 (2003): 285-94.**Refereed**

1240. **Rodkina, Alexander E., and V. Nosov**. "On Stability of Stochastic Delay Cubic Equations." Fourth International Conference on Dynamic Systems and Applications: May 21-24, 2003)Morehouse College, Atlanta, USA: Atlas Conferences Inc., 2005. 27-28. http://atlas-conferences.com/cgi-bin/abstract/cajw-01.
Stochastic differential equations with cubic main part containing delays and nonlinear stochastic disturbances are considered. A.s. asymptotic stability of trivial solution has been proved. Stability conditions are directly expressed in terms of equations coefficients.

1241. **—-**. "Stability of Cubic Neutral Functional Equations." Abstracts of 2nd IFAC Symposium on System, Structure and Control: (Oaxaca, Mexico: December 8-10), 2004.

1242. **Rodkina, Alexander E., V. Nosov, and J. M. Gomez.** "On Application of Kharitonov's Theorem to Analysis the Stability of Journal Bearings." Functional Differential Equations 10.3-4 (2003): 555-61.**Refereed**

1243. **Rodkina, Alexander E., and L. O'Neil** . "Almost Surely Bondedness of Solution to Modified Stochastic Approximation Procedure." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences [Abstract]: Kingston, Jamaica: Faculty of Pure and Applies Sciences, University of the West Indies, 2003.

1244. **Rodkina, Alexander E., and Henri Schurz.** "Almost Sure Asymptotic Stability of Drift-Implicit Solutions Theta-Method for Bilinear Ordinary Stochastic Differential Equations in R^1." Journal of Computation and Applied Mathematics 180.1 (2005): 13-31.**Refereed**

1245. **—-.** "Global Asymptotic Stability of Solutions to Cubic Stochastic Difference Equations." Advances in Difference Equations 3 (2004): 249-60.**Refereed**
http://www.hindawi.net/access/get.aspx?journal=ade&volume=2004&pii=S1687183904309015.
Refereed
Global almost sure asymptotic stability of solutions of some nonlinear stochastic difference equations with cubic-type main part in their drift and diffusive part driven by square-integrable martingale differences is proven under appropriate conditions in R1. As an application of this result, the asymptotic stability of stochastic numerical methods, such as partially drift-implicit -methods with variable step sizes for ordinary stochastic differential equations driven by standard Wiener processes, is discussed.

1246. **—-.** "Theorem on Asymptotic Stability of Solutions of Nonlinear Stochastic Difference With Volterra Type Noise ." The South African Cellular Telecommunications Association (SACTA) 6.1 (2004): 23-34.

Rodkina, Alexander E. See also 1215.

1247. **Scott, M. P., Timothy S. Stitt, N. S. Scott, and P. G. Burke.** "Electron Impact Ionization Using an R-Matrix Approach: Correlations, Polarization and Ionization in Atomic Systems." American Institute of Physics Proceedings 64 (2002).

1248. **—-.** "On the Single Differential Cross Section for Electron Impact Ionization of Atomic Hydrogen Near Threshold." Journal of Physics B: Atomic, Molecular and Optical Physics 35 (2002): L323-L329.**Refereed**

Reports on the results of the S single differential cross section (SDCS) for electron impact ionization of atomic hydrogen at 4.0 eV above threshold using the 'intermediate energy R-matrix method' in conjuntion with a two-dimensional R-matrix propagation approach. The current approach employs a more densely packed pseudo-state basis and larger interaction volume than in previous close-coupling calculations. Using this, together with different numerical techniques for analysing the SDCS data, provides a greater understanding of the differences that have arisen between previous theoretical studies. The current results are in excellent agreement with recent time-dependent close-coupling and exterior complex scaling calculations.

1249. **Stitt, Timothy S., K. Bartschat, M. P. Scott, P. G. Burke, N. S. Scott , A. M. Grum-Grzhimailo, S. Riordan, V. Ver Steeg, and T. I. Strakhova.** "Convergence of the Energy-Differential Ionization Cross Sections Obtained From a T-Matrix Approach With R-Matrix Wavefunctions." Physical Review A 65.062715-1:6 (2002).**Refereed**

1250. **Stitt, Timothy S., M. P. Scott, N. S. Scott, and P. G. Burke**. "Electron Impact Ionization Using an R-Matrix Approach." Proceedings of the International Symposium on (e,2e), Double Photoionization and Related Topics and the XI International Symposium on Polarization and Correlation in Electronic and Atomic Collisions, Rolla, Missouri (July 2001), AIP Conference Proceedings 604, Correlations, Polarization and Ionization in Atomic Systems: 2002) Editors D. H. Madison and M. Schultz. 2002.

1251. **Stitt, Timothy S., N. S. Scott, M. P. Scott, and P. G. Burke**. "2-D R-Matrix Propagation: A Large Scale Electron Scattering Simulation Dominated by the Multiplication of Dynamically Changing Matrices." VECPAR 2002 5th International Meeting on High Performance Computing for Computational Science Conference Proceedings Vol III: (Portugal: 2002).

Stitt, Timothy S. See also 1216, 1217, 1247, 1248

1252. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences, the University of the West Indies, Mona, March 18-20, 2003. eds. Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003

Department of Physics

1253. **Amarakoon, Dharmaratne M., and Anthony Chen.** "Energy Resource Studies in Jamaica." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 129-32.
This research looks at the alternative method, namely the use of wind power, to combat the country's heavy dependence on imported fuels, especially petroleum. Results are included in the form of figures and tables summarising the findings of the research.

Amarakoon, Dharmaratne M. See also 1257, 1258, 1260

1254. **Ashby, Soyini A., and Michael A. Taylor**. "Developing Statistical Models for Predicting Rainfall in the Caribbean." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 88.

1255. **Brown, Lawerence, and Anthony Chen**. "Statistical Downscaling of Global Climate Model Output for Caribbean Islands." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 70-71.

1256. **Chen, Anthony.** "Overview of the Research of the Climate Studies Group, Mona." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 136-38.
The author summarises the research activities of the Climate Studies Group at Mona. He sites the advantages of being able to predict the climate of the atmospheric system, thus deriving the contributory factors of mean climate and improving awareness of global changes. The Climate Study Group is therefore reported to be undertaking techniques of dynamic modeling of climate by numerical models. Collaborative research done is also cited.

1257. **Chen, Anthony, and Dharmaratne M. Amarakoon.** "Climate and Sugar Cane Yield." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 138-42.
The authors report on studies carried out on sugar cane yield and sucrose content relative to the combination of regulation of cumulative rainfall and coinciding temperature. The seasonal growth of sugar cane is predicted based on the prevailing patterns of the climate occurring in the environment. Qualitative data is also given based on the recurring patterns studied.

1258. **—-.** "Climate Epidemiology." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 132-35.
The effects of rainfall and temperature, contributing factors to occurring climate, are sited as the reason for the adverse impact of Dengue Haemorrhagic Fever (DHF) in the Caribbean. The effects in general, of increasing cases of Dengue fever are seen as having a domino effect not only on life but also on sectors of the society such as manufacturing and commerce and tourism. Statistical data on the susceptibility of Dengue epidemics across the Caribbean region is also given.

Chen, Anthony See also 1253, 1255, 1267, 1275

1259. **Clarke, Leonardo A., and Joseph Skobla**. "A Microcontroller Cellular Based Communication Network for a GPS Error Correction System." 2004 IEEE Aerospace Conference Proceedings, IEEEAC Paper #1314: March 6-13, 2004)Big Sky, Montana: IEEE, 2004. (CD-ROM)

Designed to provide low cost tracking and navigation services in Jamaica, these services will be possible using the University of the West Indies Cellular Based Error Correction System. The UWI-CBECS System incorporates the Global Positioning System (GPS) [3, 4], a Global Navigation Satellite System which is able to provide position information anywhere on earth. The GPS system by itself cannot provide the accuracy needed, due to uncontrollable factors. The UWI-CBES system will have means to significantly reduce or eliminate the errors introduced by these factors, thus significantly increasing the accuracy of the system. The UWI-CBECS system will require a reliable low cost bidirectional communication network in order to provide the services at low cost.

This paper will introduce a novel multi-node communication network that is built incorporating an existing cellular phone network. A network like this would eliminate the cost of setting up extensive broadcast sites and reduce maintenance and operational cost significantly. When the traffic is high on the network the system is unable to handle a large number of subscribers, thus a number of subscribers will be denied access to the system.

Clarke, Leonardo A. See also 1270, 1271, 1273

1260. **Crosbourne, Rainaldo F., Dharmaratne M. Amarakoon, and Michael A. Taylor**. "Developing a Caribbean Climate Interactive Database." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 88.

1263. **McFarlane, Glenford A., and Joseph Skobla**. "GPS Based Marine Communicator ." 2004 IEEE Aerospace Conference Proceedings, IEEEAC Paper #1404: March 6-13, 2004)Big Sky, Montana: IEEE, 2004. (CD-ROM)

Information and communication technologies have a direct impact on the economic development, and socio-cultural value system of society. The inclusion of satellite aided navigation in transportation is well established worldwide. Air and sea travel has been the main beneficiary of the technique of acquiring accurate position and timing. In recent years, however, satellite navigation has started to expand into other areas such as recreation, security, and emergency response. Within the next five years all marine vessels will be required to have an automatic identification system. It is with this in mind that a project to provide low cost but effective tracking units and service to mariners in Jamaica is being undertaken. The communication programmable microcontroller based processing unit was developed as an alternative solution to more expensive commercial products. The goal of the project is to provide GPS tracking solution for fishing boats and recreational vessels.

1264. —-. "UWI System Can Improve Safety for the Fishing Industry in Jamaica ." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 52.

1265. **Ngalamou, Lucien, and Harold Campbell**. "Diabetic Information Appliance." 15th IEEE Symposium on Computer-Based Medical Systems (CBMS'02), 2002: (Maribor, Slovenia: June 4-7 2002) p. 3-6. http://doi.ieeecomputersociety.org/10.1109/CBMS.2002.1011346.

In this paper, we present a system called "Information Appliance for Diabetic Patients" which is designed for the monitoring of diabetic patients [1]. The system is an embedded microcomputer that can be used for self or remote

monitoring. IADP is able to store a "Patient profile (PP)". Each patient profile consists of at least the patient's name, age, sex, address, weight, occupation, known allergies, medical history and the nearest hospital's telephone number, doctor's phone and page numbers. In addition each profile has a database of the patient's blood sugar, blood pressure, body mass index, periodical urine analysis (protein, glucose, bodies), diet, drug intakes (including dosage quantity and time taken), and exercise periods. IADP also creates schedules for a patient, notifying him as to when his medication should be taken; the required amount is based on factors such as age, weight and daily activities. IADP has the ability to communicate with the external world for remote monitoring using a modem link.

1266. **Ngalamou, Lucien, and Leary Myers.** "System-on-a-Chip for Information Technology and Automation." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 148-53.

The authors report on the two projects as they apply to undertaking the complete design of a group of electronic systems suitable for information technology and automation. The design of the Integrated Digital Service System suitable for homes and small enterprises is detailed

1267. **Owino, Albert, Anthony Chen, and Michael A. Taylor**. "The Role of Southwestern Caribbean in the Formation of Tropical Storms in the Caribbean Basin." [Abstract] Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 37-38.

1268. **Peterson, T. C., Michael A. Taylor, R. Demeritte, D. L. Duncombe, S. Burton, F. Thompson, A. Porter, M. Mercedes, E. Villegas, R. Memexant Fils, A. Klein Tank, A. Martis, R. Warner, A. Joyette, W. Mills, L. Alexander, and B. Gleason.** "Recent Changes in Climate Extremes in the Caribbean Region." Journal of Geophysical Research 107.D21 (2002): 4601.**Refereed**

A January 2001 workshop held in Kingston, Jamaica, brought together scientists and data from around the Caribbean region and made analysis of indices of extremes derived from daily weather observation in the region possible. The results of the analyses indicate that the number of days having very warm maximum or minimum temperatures increased strongly since the late 1950s while the number of days with very cold temperatures decreased. One measure of extreme precipitation shows an increase over this time period while the one analyzed measure of dry conditions, the maximum number of consecutive dry days, is decreasing. These changes generally agree with what is observed in many other parts of the world.

1269. **Pyne, Richard A., and Ezra K. Mugisa** . "Software Supermarket: Components on Sale." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 89-90.

1270. **Scarlett, Calmin D., Leonardo A. Clarke, Ryan O. Turner, and Joseph Skobla**. "Cellular Based GPS Error Correction System." Proceedings, XVII Imeko World Congress: Metrology in the 3rd Millennium, June 22-27, 2003, Dubrovnik, Croatia: Editors Damir Ilic, Mladen Borsic, and Josip Butorac. Dubrovnik, Croatia: Croatian Metrology Society, 2003. 83-86. (CD-ROM)

The Micro-tracking System in development at the Physic Department, University of The West Indies is aimed at providing an effective vehicle and asset tracking system which will cover the entire island of Jamaica. The system uses Global Positioning System (GPS) technology in determining location of an asset equipped with a processing unit which was developed by UWI. We aim to improve this system by increasing the accuracy and efficiency of the system and adding navigational capabilities. This is a cost effective GPS error correction system designed to work

with a GSM cellular network. Several factors introduce errors in GPS based positioning calculations. This system is geared towards reducing and/or eliminating these errors and thus increasing the accuracy of the GPS system. This system is able to provide the same services as the Differential GPS (DGPS) systems which are in use today. The DGPS systems use Radio Frequency (RF) transmitters to broadcast error correction information. Our system which uses the existing cellular phone network will eliminate the expensive RF transmitter and the limitations associated with them, thus drastically reducing cost and increasing efficiency significantly. Errors in the psuedorange measurements affect the quality of the GPS solution. These errors can be modeled, and by using DGPS techniques the errors can be removed. Neural Networks and Kalman Filters show much potential in implementing an elegant and efficient solution to the problem. Mapping information and software is needed for both tracking and navigation. The paper is describing implementation of a mapping-software which is able to pin point accurately the GPS receiver position on a digital map. This software will also implement a route planning algorithm, which will be able to generate the "shortest path", whether shortest time or shortest distance, from point A to point B by considering distance, number of turns, traffic lights, traffic congestion and other dynamic information.

1271. —-. "GPS Tracking System With Error Correction." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 89.

1272. **Skobla, Joseph.** "GPS and Electronics." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 146-48.

1273. **Skobla, Joseph, Ryan O. Turner, Leonardo A. Clarke, and Calmin D. Scarlett**. "Contribution to Error Correction for a GPS Tracking System." Proceedings of the 2nd International Symposium on Measurement, Analysis and Modeling of Human Functions: The 1st Mediterranean Conference on Measurement June14-16, 2004, Genova, Italy : Genova, Italy: IMEKO; IEEE SMC; SICE, 2004.
This article describes a contribution to an error evaluation of the GPS Tracking System. Focus of the article is on GPS receiver, satellite in revies with a dilution of precision and finally on the error of the GPS position projected on the map. Mapping software is an integral part of the GPS Tracking System.

Skobla, Joseph See also 1259,1263, 1264, 1270, 1271, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285

1274. **Spence, Jacqueline M., and Michael A. Taylor**. "Examining the Effect of Concurrent Sea Surface Temperature Anomalies on Caribbean Rainfall." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 72.

1275. **Stephenson, Tannecia S., and Chen Anthony**. "Analyzing and Understanding Climate Variability in Caribbean Islands." [Abstract]. Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences: Editors Daniel N. Coore and Robert J. Lancashire. Kingston, Jamaica: Faculty of Pure and Applied Sciences, University of the West Indies, 2003. 45-46.

1276. **Taylor, Michael A., D. B. Enfield, and Abraham A. Chen.** "The Influence of the Tropical Atlantic Vs. the Tropical Pacific on Caribbean Rainfall." Journal of Geophysical Research 107.C9 (2002): 3127.**Refereed**
The Caribbean rainfall season runs from May through November and is distinctly bimodal in nature. The bimodality

allows for a convenient division into a early season (May-June-July) and a late season (August-September-October). Evidence suggests that interannual variability in the early season is influenced strongly by anomalies in the sea surface temperatures of the tropical North Atlantic, with positive anomalies over a narrow latitudinal band (0^0 – 20^0N) being associated with enhanced Caribbean rainfall. The coincidence of this band with the main development region for tropical waves suggests a modification of the development of the waves by the warmer tropical Atlantic. The strong influence of the tropical North Atlantic wanes in the late season, with the equatorial Pacific and equatorial Atlantic becoming more significant modulators of interannual variability. The spatial pattern of significant correlation suggests strongly the influence of the El Niño/La Niña phenomenon, with a warm Pacific associated with a depressed late season and vice versa. There additionally seems to be a robust relationship between late season Caribbean rainfall and an east-west gradient of sea surface temperature (SST) between the two equatorial oceanic basins. Oppositely signed SST anomalies in the NINO3region and the central equatorial Atlantic (0^0 15^0 W, 5^0 S 5^0 N) are well correlated with Caribbean Rainfall for this period.

1277. **Taylor, Michael A., and Albert Owino.** "Warm Oceans and Year to Year Variations of Caribbean Rainfall." Science, Technology and Innovation: UWI Mona Leading the Nation . Mona, Jamaica: University of the West Indies, Mona, 2004. 142-46.

Focuses on climate and its relative impact on life and daily existence in the Caribbean. Focuses on the need to understand the mechanisms which derive the year to year variations of seasonal climate. Hence the use of sea surface temperature (SST) is on modulating device/mechanism is suggested to be applicable for climate predictions, which give sufficient time to enable action to benefit from forecasted scenario.

Taylor, Michael A. See also 1254, 1260, 1267, 1268, 1274

1278. **Turner, Ryan O., and Joseph Skobla**. "A Mapping Solution for GPS/GIS in Kingston, Jamaica." 2004 IEEE Aerospace Conference Proceedings, IEEEAC Paper #1313: March 6-13, 2004)Big Sky, Montana: IEEE, 2004.**Refereed**
(CD-ROM)

This paper explores the implementation of an algorithm that correlates coordinates expressed in longitude and latitude with a coordinate system specific to Jamaica. Using available information of the road network the GPS results obtained from a vehicle equipped with a GPS receiver and a GSM modem is corrected to fit on a road segment in the network. The national coordinate of Jamaica, JAD69, was used to project the data. JAD69 is based on a Clarke ellipsoid. However, few GPS receivers are compatible with the JAD69 coordinate system. Therefore a datum shift results and a transformation formula has to be employed to have the two systems agree. The algorithm will incorporate the inaccuracy of the map and the GPS receiver to provide the level of accuracy sufficient to ensure that a vehicle's detected location will correspond to the digitized representation of the road on which the vehicle is traveling.

1279. **—-.** "The Performance of Map Matching in Vehicle Position Sensing." IEEE Aerospace Conference, IEEEAC Paper # 1001 Version 7 (2005): 1-9.**Refereed**

Satellite-based positioning systems, such as global positioning system, with the aid of a GIS based digital road network, can be used as the position sensor of a vehicle navigation system. From this integration an efficient and effective navigation system can be developed. By integrating the positioning system with a digital road network, errors undergone by the positioning system can be corrected therefore producing a better estimate of the location of the vehicle. This will help in the navigational functions of the system. This paper develops a general map matching algorithm to overcome the inaccuracies of both the positioning system and the road network system to provide accurate determination of the vehicle's location, by evaluating a list of candidate road segments on a set of criteria and assigning them a weighting score. The projection of the point onto the selected road segment is also discussed.

Despite extensive efforts by engineers there are errors associated with the positioning sensor system and the spatial road network data. The algorithm takes into account the general degree of inaccuracy of the particular position sensor, the historical path of travel of the vehicle, typological information of the road network and the heading of the vehicle. The paper also examines the criteria that are used in map matching algorithm and the ideal relation between the different criteria and the weighting score of the candidate road segments. The data presented in this paper is as a result of the evaluation of the performance of this algorithm on data gathered from a field test carried out in the urban road network in the major metropolitan area of Kingston, Jamaica.

1280. **Young, Andrew S., and Joseph Skobla**. "GPS-Based Marine Vessel Tracking Device." 2003 IEEE Aerospace Conference Proceedings, IEEEAC Paper #1139: March 8-15, 2003)Big Sky, Montana: IEEE, 2003 (CD-ROM).**Refereed**

Information and communication technologies have a direct impact on the economic development, political organization, and socio-cultural value system of a society. The inclusion of satellite aided navigation in transportation is well established worldwide. Air and sea travel has been the main beneficiary of the technique of acquiring accurate position and timing. In recent years, however, satellite navigation has started to expand into other areas such as recreation, security, and emergency response. In fact by the next five years all marine vessels will be required to have an automatic identification system (AIS). It is with this in mind that a project of this nature is currently being carried out to provide low cost but effective tracking units and service to mariners in Jamaica. The communication programmable microcontroller based processing unit was developed as an alternative solution to more expensive commercial products. The goal of the project is to provide GPS tracking solution for fishing boats. The processing unit is equipped with two communication ports one dedicated for the GPS receiver and the second for radio link. One of the main features is a robust self responded programmable mode of operation.

1281. —-. "Preprocessing Communication Unit (PCU) With Short Message Service (SMS) Communication Channels for AVL Tracking." Proceedings of SPIE, Ed. Yilin Zhao. 2003.

The preprocessing GPS - SMA Communication Unit (PCU) is a mobile tracking device used within AVL tracking systems for determining the location of vehicles. It was designed primarily to utilize the SMS service of the GSM network for communicating. The use of SMS messages is part of an effort aimed at providing a cost effective alternative for tracking the location of vehicles. Its primary function is to send information about user location across a GSM network to a Central Base Station (CBS) from which assets are being tracked. Though SMS is the main bearer, the unit is also capable of using Circuit Switch Data Service (CSD) to send and receive data from the Base Station (BS). The PCU was developed as a small hardware unit based on the Microchip microcontroller, with a multiplexer switching two RS 232 serial inputs. One input is dedicated to the GPS receiver and the second one to the wireless modem.

1282. **Young, Andrew S., and Joseph Skobla**. "Preprocessing Communication Unit With Short Message Service Communication Channels for AVL Tracking." SPIE Proceedings. Location Services and Navigation Technologies: 2003), 2003.

1283. **Young, Andrew S., and Joseph Skobla**. "Robust GPS-SMS Communication Channel for the AVL System." 2003 IEEE Aerospace Conference Proceedings, IEEEAC Paper #1184: March 8-15, 2003)Big Sky, Montana: IEEE, 2003. (CD-ROM) **Refereed**

The Pre-Processing GPS-SMS Communication Unit (PCU) was developed as a part of the University of The West Indies (UWI) Micro-Tracking System project. This project is aimed at developing a comprehensive cost effective system for tacking the location of vehicles across Jamaica. The PCU is the mobile Unit component of tracking system. Its primary function is to send information about user location across a GSM network to a Central Base Station from which assets are being tracked. The unit uses GSM Short Message Service (SMS) as the main bearer to communicate with the Base Station. The unit is also capable of using Circuit Switch Data Service CSD to send and receive data from the Base Station. The PCU was developed as a small hardware unit based on the microchip microcontroller, with a multiplexer switching two RS 232 serial inputs. One input is dedicated to the GPS receiver and the second one to the wireless modem.

1284. —-. "SMS TCP/IP Interface." 2003 IEEE Aerospace Conference Proceedings, IEEEAC Paper #1183: March 8-15, 2003)Big Sky, Montana: IEEE, 2003.(CD-ROM) **Refereed**
The SMS TCP/IP Interface is a layered software module which provides a structured method for adding short message service (SMS) functionality to Moving Maps Tracking Software. The system uses a TCP/IP connection method to interface with the tracking software. In an Automatic Vehicle Location (AVL) system that uses SMS messages to send tracking data to its Base Station, the SMS TCP/IP interface is responsible for the reception and processing of messages at the BS before passing the data to the tracking software. The interface software also demonstrates an easy structured method for adding new services, functionality, protocols and even hardware to an AVL Systems with minimum changes to the base station arrangement.

1285. **—-.** "The Universal Preprocessing GPS - SMS Communication Unit for the AVL System." Proceedings of the Sixth Conference, Faculty of Pure and Applied Sciences [Abstract]. Editors . Kingston, Jamaica: Faculty of Pure and Applies Sciences, University of the West Indies, 2003. 28-29.