

## DESIGN OF A HIGHLY STABLE OPTICAL pH SENSOR FOR BIO-REACTOR MONITORING

NENA V. RODRIGUEZ and O.S. WOLFBEIS. Research Center for the Natural Sciences, Sensors Divisions, University of Santo Tomas, Espana, Manila

A pH sensor was designed in which a commercially available dye (Merck N-9) was covalently immobilized on a 10 -  $\mu\text{m}$  layer of cellulose coating on a 70-170  $\mu\text{m}$  transparent polyester planar support. The sensor changed color from yellow (in acidic solution) to blue (in alkaline solution). The calibration curve of the sensor exhibited sensitivity at pH 5 to 9 with a pKa (pseudo) at 7.24. Steady-state response times were obtained in less than 60 sec. The sensor also showed high reproducibility and long-time stability. It was tested for more than 12 hours of continuous use and was given r.s.d. values of only 1% and less. Such characteristics make the sensor highly suitable for use in a homemade opto-electronic device for the measurement of pH in bioreactors [1].

## BIOLOGICAL SCIENCES

### STUDIES ON SOME USEFUL FERNS IN MINDANAO

VICTOR B. AMOROSO, Central Mindanao University, University Town, Musuan, Bukidnon

Field survey and collections of ferns conducted in various places in Mindanao revealed 70 species of economic importance. Of this number, 18 species are utilized as human food, 9 species for handicraft manufacture, 46 are medicinal, 34 species are ornamental plants and many species have other specific uses. These useful ferns can be managed to contribute to the socio-economic progress of the country especially in the rural areas of Mindanao.

Nutritive chemical analysis on some edible fern fronds showed the presence of P, Ca, Fe and Mg. Likewise, histochemical tests from fresh medicinal plants also revealed the active principles localized in various tissues and organs of the plant body. The active principles such as alkaloids, glycosides, tannins, saponins, and organic acids were observed from detectable to very abundant depending on the species of ferns.

## CLONING OF THE RED PIGMENT GENES OF *XENORHABDUS LUMINISCENS* HM1<sup>o</sup>

PRIMA C. RAGUDO-FRANCO and K.H. NEALSON. College of Arts and Sciences, Mariano Marcos State University, Batac, 2906, Ilocos Norte

*Xenorhabdus luminiscens* is symbiotic with the entromopogenic nematode *Heterorhabditis bacteriophora* (Poinar et al. 1980; Poinar and Thomas 1966; Akhurst 1983). The symbiotic pair together act as parasites of insects (Poinar and Thomas 1967). Once an infective nematode harboring *Xenorhabdus luminiscens* reaches the hemolymph of an insect, it releases its bacterial symbionts. The bacteria multiply and presumably participate in some way to the demise of the insect (Gaugler 1988). The nematode completes its life cycle and gives rise to infective juveniles which soon emerge from the insect carcass in search of new prey (Poinar 1983).

*Xenorhabdus luminiscens* can exist as two forms referred to as primary and secondary, the latter arising as a variant of the former after a long period of static incubation (Bleakley and Nealson 1988). Observed primary characteristics which are lacking and diminished in the secondary are: (1) red pigmentation (Richardson, et al. 1988, Beakley and Nealson 1988); (2) bioluminescence (Akhurst 1980; Poinar, et al., 1980); (3) antibiotic activity (Akhurst 1982; Paul, et al. 1981); (4) lipase activity (Akhurst 1983); (5) neutral dye uptake (Akhurst and Boemare 1988); (6) intracellular portein crystals (Bowen and Ensign 1987, 1988; Couche et al. 1987); and extracellular protease production (Schmidt, et al. 1988).

This paper involves studies about the genes responsible for one of these features: pigment formation. The pigment genes were cloned and expressed in *E. coli*, the recombinant plasmid named pCGLS 100, was screened and isolated, and a partial restriction map of the 8.1 kb insert was constructed. The fragment was nick translated, labelled with <sup>32</sup>P, and subsequently used as a probe for other *Xenorhabdus* species. The probe hybridized with the Southern blots of the Eco RI cut genomic DNAs of the *X. luminiscens* Hm primary; *X. luminiscens* Hm secondary, *X. luminiscens* NC19 primary, *X. luminiscens* NC19 secondary with pigment, *X. luminiscens* NC19 secondary without pigment and *X. luminiscens* Fla primary.

## HOMOZYGOSITY AND FIELD PERFORMANCE OF SPINELESS *RICINUS COMMUNIS* L.

ADORACION T. ARANEZ and M.B.I. BACANO. Institute of Biology, College of Science, UP Diliman, Quezon City

Seeds from self-pollinated Indonesian-Bangkok cross (TBC), Bangkok brown spotted (BBS) and Indonesian (IND) were planted, first in plastic cups

and later transplanted to the field, one plant per hill at a distance of one meter between and within rows following a completely randomized block design, grown to maturity and observed regularly. The study showed that the spineless IBC was early-maturing and high-yielding as compared with the parents, BBS and IND. Survival percentage was highest in IBC followed by IND. BBS had the lowest survival percentage. Oil content and seed weight of IBC was between that of BBS and IND. Seed protein profiles showed that of the 19 bands of IBC, only one was not observed in BBS and two, in IND, with all the other bands in the three strains being homologous. Similarity index between IBC and BBS was 95%, between IBC and IND, 89% and between BBS and IND, 84%. Seed protein profiles in all IBC plants studies were similar, confirming that the F<sub>7</sub>IBC was already homozygous as also revealed by their morphological characteristics.

#### SCREENING AND CHARACTERIZATION OF MICROORGANISMS FOR COAL BIOSOLUBILIZATION

EVELYN BATTAD-BERNARDO; S. NEGORO and I. URABE. Natural Science Research Institute, UP Diliman, Quezon City

Biological conversion of coal has received considerable scientific attention during the past ten years as an economically viable alternative to the conventional liquefaction and gasification of coal. Most of the works were focused on the screening, isolation and identification of microorganisms capable of solubilizing coal. In this study, a number of microorganisms were examined for their ability to biosolubilize untreated coals in two screening tests. Newly isolated microorganisms screened by their growth in coal extract medium were found to biosolubilize the coal particles. Out of the numerous isolated strains, two promising strains, *white mold C3M2628* and *actinomycete S43637*, were further characterized based on a number of parameters and their metabolic response in the presence of either coal extract, or coal particles. The liquified medium yalloun coal extract culture supernate of strain S43637 were both found to contain water-soluble, alkaline, polar to moderate or highly non-polar, heterogeneous, low to high molecular weight compounds.

#### METAZOAN PARASITES FROM THREE SPECIES OF PHILIPPINE GROUPERS

NELLIE C. LOPEZ, Institute of Biology, College of Science, UP Diliman, Quezon City

*Epinephelus macrospilos* (Bleeker) and *Epinephelus bleekeri* (Vailant and Bocourt) from Manila Bay, and *Epinephelus fuscoguttatus* (Forsakal) from Lucena, Quezon were obtained from wet markets in Metro Manila for parasitic examination. The parasites recovered from the gills and internal organs were trematodes, a larval cestodes nematodes, copepods, and a larval isopod.

*Deplectanum* sp. (Monogenea: Diplectanidae), from the gills, was the most prevalent parasite recovered from *E. macrospilos* (65%) and *E. bleekeri* (43%). In *E. fuscoguttatus*, the most common parasite was *Prosorhynchus* sp. (Digenea: Bucephalidae) (14%). Four parasite species (*Prosorhynchus* sp., the nematodes, *Spirocamallanus* sp. and *Goezia* sp., and a larva of a gnathiid isopod) were found in all three fish hosts. *Helicometra* sp. (Digenea: Opecoelidae), *Erilepturus* sp., (Digenea: Hemiuridae), a larval cestode (Cestoda: Trypanorhyncha), and *Hatschekia* sp. (Copepoda: Hatschekiidae) occurred in two hosts. Caligue sp. (Crustacea: Copepoda) was recovered only from *E. fuscoguttatus*, while *Podocotyloides* sp. (Digenea: Opecoelidae) only from *E. bleekeri*.

#### GLYCINE IN FISH CENTRAL NERVOUS SYSTEM AFTER EXPOSURES TO MANGANESE

GLORINA N. POCSIDIO and E.S. CATAP. Institute of Biology, College of Science, UP Diliman, Quezon City

In experimental rats, chronic exposures to manganese induced both behavioral effects and pronounced alterations in neurotransmitter levels and metabolism. The dopaminergic system appeared markedly affected. Previous to this study, however, the glycinergic system had not been investigated. The results of the present study in *Oreochromis mossambicus* have shown that a high dose of manganese significantly increased levels of glycine, a phenomenon which could account for the marked inactivity of fish even for feeding. Acute treatment significantly increased glycine in the cerebrum, diencephalon and optic lobes. Prolonged or chronic exposure resulted in high glycine levels in all major regions of the CNS including the spinal cord.

#### MORPHO-ANATOMICAL STUDIES OF *IN VITRO* CULTURED NODE EXPLANTS OF *DIOSCOREA ALATA* L.

CECILIA B. AMOROSO. Department of Biology, College of Arts and Sciences, Central Mindanao University, Musuan, Bukidnon

Node explants of *Dioscorea alata* L. var. kinampay were cultured *in vitro* in revised Murashige and Skoog basal medium supplemented with varying concentrations of N<sup>6</sup>-benzyladenine and naphthalene acetic acid to assess their development through histological studies. The explants in all treatments developed small compact calli after 15 days. Anatomically, the calli were characterized by the presence of small cells with densely stained nuclei and cytoplasm. These cells gave rise to shoot bud primordia and root structures. Plantlet formation was observed in treatments 1 (MS only), 2 (MS + 0.5 mg BA), 3 (MS + 1.0 mg BA + 0.5 mg NAA) and 6 (MS + 1.0 mg BA + 5.0 mg NAA).