solution. Figure 1 shows the absorbance of the 0.1 *M* hydrated Ni^{++} ion and the fluorescence emission of the scintillator[4]. Standard 22-ml glass counting vials of low potassium content were used. The method for sample preparation was a modified version of MYERS and BUSH[5]. 1 g of anthracene was firstly added into each vial. 2 ml of the stock solution was then introduced and the suspension was well stirred. This operation was repeated for 4 times so that each vial contained 5 g of the scintillator and 10 ml of the solution. The aqueous phase was held in the crystal interstices and no liquid spreaded over the crystal surfaces nor floated the crystals on the liquid. Crystals adhering to the wall above the scintillator bed and to the stirring rod were scraped down with a fine and hard nylon brush. The vial appeared to be about $^2/_3$ full. Dry samples were also prepared by placing the sample vials without caps in a vacuum desiccator over calcium chloride until no more than 0.5% of water had been left. Five identically prepared samples were made for obtaining better counting statistics. Prior to counting all samples were dark-adapted for 24 h to eliminate phosphorescence.

The activities of all samples were counted at 5 °C in a Packard Tricarb 3320 Liquid Scintillation Spectrometer equipped with bialkali photomultiplier tubes (EMI 9635QB). The discriminator settings were 10 and 1,000, respectively, with a 25% gain. With these settings the cut-off of the β-spectrum was just at the window edge. The thermionic noise was also eliminated. The settings were, therefore, optimized for obtaining the maximum counting rate. The background rate was obtained by counting for 1 h. The rate for a blank, which was a suspension of 5 g of anthracene and 10 ml of water, was 22 cpm. Activities of all samples were counted for 10 min.

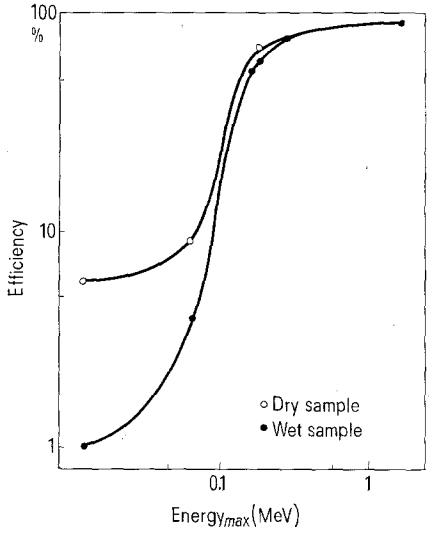

Fig. 2. β-Energy dependence of counting efficiency of anthracene.

The counting efficiencies of anthracene for wet and dry samples were found to be (4.1 ± 0.1 SD)% and (9.3 ± 0.2 SD)%, respectively. Figure 2 shows the efficiencies for ^{63}Ni and the energy dependence of efficiency for counting the activities of some other β-emitters[6]. The 'merit value', which is defined as the product of the percentage efficiency and the volume expressed in ml of the aqueous sample, was calculated to be 41 or 92 for the wet of dry sample, respectively. This value could possibly reach 62 or 138, respectively, if the vial is filled with 50% more of the scintillation mixture, assuming the efficiency is not affected appreciably by the increase in volume of the mixture.

In conclusion, the performance of anthracene as a suspended scintillator for assaying ^{63}Ni in aqueous medium was found satisfactory. It was comparable to that of the homogeneous and gel systems recently investigated[7]. Sample preparation without drying required a normal working time of about 5 min each. Depending upon the nature of the sample, the amount of dissolved material, and the activity present, the appropriate scintillation system can be conveniently selected.

Zusammenfassung. Die Zählausbeute einer Anthrazenkristallsuspension als Szintillatormaterial wurde für die Betastrahlung des Ni-63-Isotops untersucht. Die Methode ist eine anpassungsfähige Ergänzung zur bekannten Flüssigkeitsszintillationsmessung.

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[8] Present address: Department of Pharmacy, The Medical University of South Carolina, Charleston, South Carolina 29401 (USA).
[9] The authors are grateful to Dr. J. D. PUNCH of Medical College of Virginia for the use of his liquid scintillation spectrometer.

PRO EXPERIMENTIS

Electro-Actography in Fresh-Water Fish

Investigating the biological significance of electric fields for electrosensitive fresh-water fish (*Ictalurus nebulosus* LeS.), the author found that water-bound animals generally produced weak external electric fields. These electric phenomena consisted mostly of DC-fields of the dipole type, often modulated by respiratory movements[1], in the order of magnitude of several microvolts to millivolts. The AC-fields have already been described by other authors[2–7]. Their origin is unknown as yet, although muscle action currents are sometimes thought to be responsible [2–5]. SPOOR, NEIHEISEL and DRUMMOND[6] are of the opinion that they have measured only electrode potential changes due to water currents produced by respiratory movements, and may have neglected this external electric field of the fish. The author's observations showed this field to be strongly associated with the alimentary canal (DATTA and SAVAGE[8]). Anyhow, measuring these fields promised to be another method to record the diurnal activity of fresh-

water animals: if a fish or an insect larva (electric dipole) passes an electrode, the variations in electric potential can be recorded[9]. No inconvenient object has to be attached to the animal or to be placed in its surroudings as is the case in e.g. the 'magnetic induction' method[10], which however has a much wider detection range (up to 1.5 m).

The electric fields of the following species of fish were recorded: catfish (*Ictalurus nebulosus* LeS.), stickleback (*Gasterosteus aculeatus* L.), roach (*Rutilus rutilus* L.), pikeperch (*Stizostedium lucioperca* L.), and guppy (*Pcecilia reticulata* L.). During the test the fish could swim in an inflatable plastic pool (diam. 80 cm, waterheight 20 cm, and temperature of the water 10–20 °C) with, in the centre,

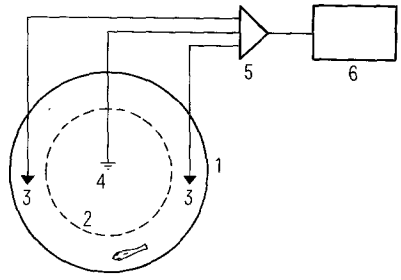

Fig. 1. Block diagram of the actography apparatus. 1. Plastic pool; diam. 80 cm, height 20 cm; 2. Nylon netting screen; diam. 50 cm; 3. Electrodes; 4. Earth electrode; 5. Princeton Applied Research type 113 preamplifier; 6. Hewlett-Packard type 7702 B oscillographic recorder.

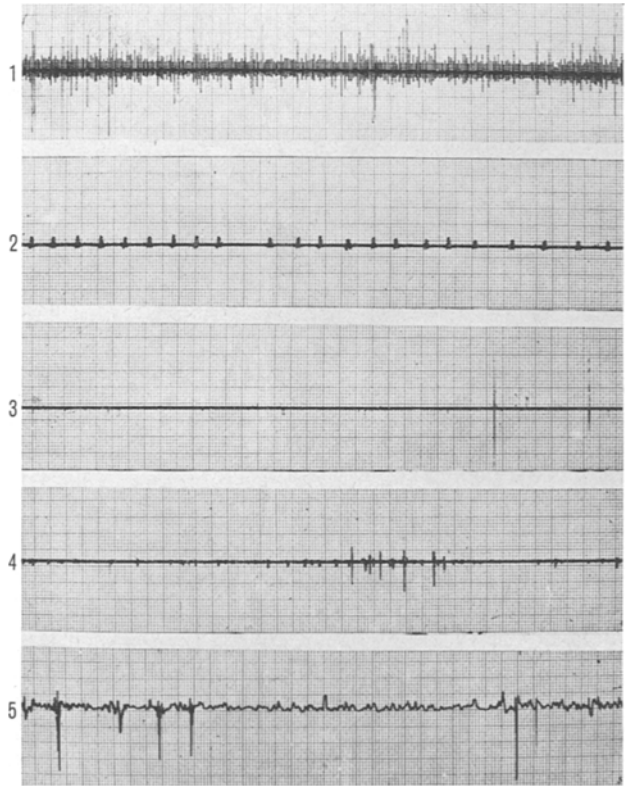

Fig. 2. Some exemplary actograms. Horizontal: Time (plate 3 and 4: 1 mm/min; plate 1, 2, and 5: 5 mm/min) Vertical: amplitude of the recorded field (amplifier bandwidth: 0,1 < f < 30 Hz; Plate 1, 2, 3 and 4: 4 μV/mm; plate 5: 10 μV/mm). 1. Minnow; 2. Pike-perch; 3. Guppy; 4. Stickleback; 5. Catfish.

a cylindrical nylon netting screen leaving the fish a 15 cm wide corridor to swim in (Figure 1). The water volume was earthed by means of a 10 cm long silver ribbon (dimensions 100 × 15 × 0.2 mm) placed in the centre of the pool. The specific resistance of the water varied from 2000–8000 Ohm. cm. The recording electrodes, chlorinated silver electrodes in a 0.1 mol KCl-solution making electric contact with the water by means of a water/2% agar-agar bridge, were placed in the middle of the outer circular section. These electrodes were practically insensitive to water turbulations and only slightly sensitive to variations in light intensity. The recorded potentials were fed to a Princeton Applied Research type 113 preamplifier and registered with a Hewlett-Packard HP 7702 oscillographic recorder. The location of the experiment was made free of electric interferences as much as possible.

Normally the radius of action of one electrode is 10 cm or 20 cm depending on the relative position of the electrodes, the length of the fish (specimens up to 20 cm have been used) and the specific resistance of the water. The amplitude of the recorded signal also depends on the fish's swimming velocity and the frequency band of the amplifier. Figure 2 shows the actograms of 5 fish: 1. A minnow, length about 10 cm, swam round and round after having been released in the corridor of the experimental pool. The swimming velocity can be deduced from the actogram (number of passages/time) and seems to have been very constant in this particular case: 14 cm/sec. 2. A pike-perch, length about 10 cm, also swam round about. Its swimming velocity was much lower than that of the minnow: about 1 cm/sec. 3. The actogram of a guppy, length about 1.5 cm, shows very tiny and sharp but nevertheless detectable peaks. 4. A stickleback, length about 5 cm, produced an actogram in amplitude comparable with the minnow's. 5. The actogram of a catfish, lenght about 15 cm, indicates a rather rapidly swimming animal possessing a fairly strong electric DC-field: up to 1 mV potential difference between mouth and anus.

Although the advantages of this method of investigation are obvious, the disadvantages are not to be neglected. In the first place, the fabrication of the electrodes has to be carried out meticulously. Secondly the offset current of the amplifier may influence the behaviour of fish that are able to perceive these weak electric currents, as is the case with catfish possessing electroreceptors. Furthermore, the detection range of this system is small compared to others[10]. Finally the electric screening of the experimental pool may be very troublesome. Also it is obvious that electric fields, produced by marine fish, do not extend as far in sea water as the fields found in fresh-water because the strong conductivity of the seawater (spec.

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resist. 20 Ohm./cm) short-circuits these electric fields to a wide extent. This fact was confirmed by measurement of the electric field of a *Labrus berggylta* L., length about 30 cm.

Zusammenfassung. Es wird eine Methode beschrieben, das Aktogramm von Fischen und anderen Süsswasserbewohnern zu bestimmen aufgrund der vom Autor entdeckten, von diesen Organismen erzeugten äusseren schwachelektrischen Felder.

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CONGRESSUS

Switzerland
8th EUCHEM Conference on Stereochemistry

at Bürgenstock, near Lucerne, 29 April–5 May 1973.

Inquiries and applications (no special forms are required) should be addressed before January 15, 1973 to the Chairman: Prof. R. H. Martin, Département de Chimie Organique, Université Libre de Bruxelles, 50, Avenue F. D. Roosevelt, B–1050 Bruxelles (Belgique).

Israel
1st International Congress for Bacteriology

in Jerusalem, 2–7 September 1973.

This will be the first international congress of the newly formed Bacteriology Section of the International Association of Microbiological Societies.
Further information about the congress may be obtained from the Congress Secretariat, P.O. Box 16271, Tel Aviv, Israel.

Italy
2nd International Symposium on Cytopharmacology of Secretion

in Venice, 17–22 June 1973.

The Symposium is organized by the Department of Pharmacology, University of Milan, and the C.N.R. Center of Cytopharmacology in Milan (Italy). Chairman: Prof. E. Trabucchi, Milan. Secretaries: B. Ceccarelli, F. Clementi and J. Meldolesi, Milan. Further information by the Secretariat: Istituto di Farmacologia dell'Università, Via Vanvitelli 32, I-20129 Milano (Italy).

Canada
2nd International Conference on Comparative Virology

at Mt. Gabriel, Québec, 27–29 August 1973.

Emphasis will be on virus evolution an oncogenic viruses. Furhter details concerning the program, housing, and registration can be obtained from: Prof. E. Kurstak, Department of Microbiology and Immunology, Faculty of Medicine, University of Montreal, P.O. Box 6128, Montréal 101, Québec, (Canada).

Austria
First International Congress for Aerosols in Medicine

in Vienna, 19–21 September 1973

Aerosols in Medicine' (Advantages and Dangers). Main Topics: 19 September: Environmental Aerosols (Air Pollution), Hygienic Aspects of Aerosols.

Secretary of the Congress: Mrs. E. Weidenhaus, Wiener Medizinische Akademie, Stadiongasse 6–8, A-1010 Vienna, Austria.

Turkey
IAEA Symposium on Radioimmunoassay and Related Procedures in Clinical Medicine and Research

in Istanbul, 10–14 September 1973.

Further information by the scientific Secretaries: Dr. E. J. Garcia and Dr. E. H. Belcher, International Atomic Energy Agency, Kärntner Ring 11–13, A–1010 Wien (Austria).