The action of batrachotoxin resembles that of the scorpion toxins, which therefore might be substitutes for batrachotoxin. If so, they should be more easily available, and being proteins, labelled derivatives could easily be prepared, they could easily be coupled to insoluble matrices for affinity chromatography, etc.

Palytoxin[105]

This toxin has been isolated from polyps of the genus *Palythoa* (*phylum Coelenterata*). It has a molecular weight of 3,300 and an LD_{50} (i.v.) of only 0.15 μg/kg mouse. Palytoxin is thus one of the most potent animal toxins known (Table II). It is not a peptide as its nitrogen content is only 1.7%. The toxin is not adsorbed to an anion exchanger (DEAE-cellulose) at pH 7, but retarded on a cation exchanger (CM-Sephadex) in 0.02 *M* NaH_2PO_4 (pH 4.6) and it is probably a cation at neutral pH. Symptoms in mice are paralysis in hind limbs, diarrhea, severe convulsions, dyspnea, and death from respiratory failure. Thus, it appears to have a neurotoxic action, but being several magnitudes more potent than the curarimimetic toxins, it seems unlikely that it would have a postsynaptic type of action.

Conclusion

I have discussed in this article only the most active toxins, with the result that many interesting substances have been omitted, e.g. the toxins from bee and wasp venoms (apamin, melittin, etc.), of many amphibians (bufotoxins, etc.), ciguatoxins, and many more. Poisons are found in every phylum except birds. Shrews exemplify venomous mammals. One gets a good illustration of the number of poisonous animals by studying the monumental and impressive work by HALSTEAD[106] which consequently excludes terrestrial animals. An interesting fact in this connection is that there are about 20,000 species of spiders, most of which are poisonous.

A toxin ranking list has to be included in an article of this kind. The list is, of course, far from complete. Data on molecular weights, mouse lethal doses, etc. are lacking for many potent toxins, such as the dysentery toxin, a neurotoxin with a toxicity comparable to that of the botulinus toxins[107], the toxins from the jelly fish *Chironex fleckeri*[106].

A comparison on molar basis gives a better notion of the toxicities. Curare has about 1/30 of the toxicity of the curarimimetic snake venom neurotoxins, clearly indicating that curare has a much lower affinity for the acetylcholine receptor.

Toxic organisms have developed during millions of years more and more refined toxins, and this evolution has probably brought into existence toxins against every physiological function. Neurochemistry is to a great extent unexplored. Progress in this field will in the nearest future depend on specific toxins from various natural sources. Toxins from spiders, scorpions, snakes, frogs, and fishes are therefore not mere curiosities but valuable tools for research on the molecular mechanisms of neural function and synaptic transmission.

[105] R. E. MOORE and P. J. SCHEUER, Science *172*, 495 (1971).
[106] B. W. HALSTEAD, *Poisonous and Venomous Marine Animals of the World* (U.S. Government Printing Office, Washington, D.C. 1965–1970), vol. 1–3.
[107] W. E. VAN HEYNINGEN, Schweiz. Z. Path. Bakt. *18*, 1018 (1955).
[108] B. R. DAS GUPTA and D. A. BOROFF, Biochim. biophys. Acta *147*, 603 (1967).
[109] W. H. BEERS and E. REICH, J. biol. Chem. *244*, 4473 (1969).
[110] M. J. B. HOLMES and W. L. RYAN, Infect. Immun. *3*, 133 (1971).
[111] S. OLSNES and A. PIHL, Eur. J. Biochem. *35*, 179 (1973).
[112] Acknowledgements. This work was supported by the Swedish Natural Science Reserach Council. I thank my colleagues Dr. DAVID EAKER and Dr. JAN FOHLMAN for many discussions and valuable suggestions during the writing of this article.

ACTUALITAS

International Cell Research Organization (ICRO)

1. *Training Courses.* One of the main activities of ICRO is the organization of training courses on topics of high novelty and on modern techniques in cellular and molecular biology: Principles and techniques of tissue and organ culture; Genetics and Physiology of Bacterial viruses; Energy transducing systems on the sub-cellular level; Methods in mammalian cytogenetics; Membrane Biophysics; DNA-RNA Hybridization; Biogenesis of Mitochondria; Embryology and Epigenetics; Interaction between Animal Viruses and host cells, application of computers to experimental work in biology and chemistry; Methods in molecular biology, etc. The courses generally last 3–5 weeks, and include 16–20 young participants (sometimes more). The ICRO courses are fully international, both the teaching staff and the participants coming from the largest possible number of countries.

2. *The Problem of Developing Countries.* Most of the past ICRO courses have been organizing in European countries – east and west – but the demand from developing countries is increasing steadily. ICRO activities in developing countries may tend to give preference to topics of potential economic usefulness, such as applied microbiology, microbial protein production, fermentation industries, soil microbiology, plant genetics, etc.

Inquiries for more information should be addressed to: Dr. Adam Kepes, International Cell Research Organization, c/o Unesco – AVS, Place de Fontenoy, 75 Paris 7e, France.