R. Emery (*Zoologica*, **56**, 115; 1971) now report that juveniles of another species of batfish, *P. pinnatus*, show a remarkable resemblance to turbellarian flatworms.

The young *P. pinnatus* is deep bodied with high dorsal and anal fins and its body is coloured black with the outline of the fins picked out in bright orange. Turbellarians often have a brightly coloured border, and at least two Pacific forms have a broad orange margin. Similar coloration is shown by some nudibranchs, which like the flatworms are known to be distasteful, if not actually toxic, to fishes. The juvenile batfish, however, improves on the mimetic effects of coloration and body form by swimming on its side, gently undulating its fins, thus imitating the swimming movements of its presumptive models. Whether this mimicry is sufficient to deter predators from eating the young *Platax* is not known, but Randall and Emery, both experienced underwater biologists, admit to being misled on first sight by the fish's resemblance to a flatworm.

Similarly, Victor G. Springer and William F. Smith-Vaniz (*Smithson. Contrib. Zool.*, No. 112, 1; 1972) have independently confused two blenniid fishes as one species, or have been misled by mixtures of species in supposedly sorted museum collections, as a result of the very close similarities in body form and coloration between two or more species. Springer and Smith-Vaniz were later able to supplement these more or less casual observations by detailed underwater observation and laboratory experiments in the Red Sea and Gulf of Aqaba.

Although these authors discuss other mimetic relationships in the blenny family the greater part of their article is taken up by discussion of a mimetic complex involving three species in this region: *Meiacanthus nigrolineatus*, a blenny with a blue to blue-grey head and anterior body, but yellowish posterior body, with a black lengthwise stripe on the body; *Ecsenius gravieri*, which is similarly coloured; and *Plagiotremus townsendi* which differs from the other two chiefly in having a horizontal white bar passing round the tip of the snout. It seems certain that *Meiacanthus nigrolineatus* is the model for the other two; it seems to be slightly more common than *E. gravieri*, and much more abundant than *P. townsendi*.

More significantly Springer and Smith-Vaniz discovered that on each side of the lower jaw of *Meiacanthus* there is a massive canine tooth with a deep groove along its anterior surface and with glandular tissue occupying a depression in the dentary bone. Pressure in the vicinity of the gland produces a ready flow of milky fluid from the canine tooth groove, and histological examination strongly suggests it to be a venom producing organ. (A specimen was induced to bite the junior author's midriff where the bite produced an irregular reddened area and later a pale welt!) Other tests involved offering *Meiacanthus* to captive native predatory fishes and naive imports from the Mediterranean. Most of the native species could not be induced to eat this blenny, or they released it very quickly after it was ingested. The Mediterranean predators (which cannot normally encounter *Meiacanthus*) quickly learned to reject it.

Springer and Smith-Vaniz's studies suggest that *Ecsenius*, which lacks venom glands and grooved canines, and is acceptable prey to larger fish-eating fishes, is primarily a Batesian mimic of the noxious *Meiacanthus*. *Plagiotremus townsendi* is presumed to enjoy a similar relative immunity to attacks by predators on account of its general resemblance to *Meiacanthus*, but the relationship is more complicated. Both *Meiacanthus* and *Ecsenius* are non-aggressive species which feed primarily on small invertebrates and for this and the unpalatable nature of the first fish they are allowed close to larger fishes. *Plagiotremus townsendi*, however, feeds on the mucus, epidermal tissue and scales of other fishes, and Springer and Smith-Vaniz report it as attacking a wide range of non-piscivorous scaled fishes in the Red Sea. It thus seems more likely that in addition to deriving protection by its resemblance to the unpalatable *Meiacanthus*, *P. townsendi* uses the non-aggressive nature of both *Meiacanthus* and *Ecsenius* as a Trojan horse to approach its own prey. The relationship of these three species is thus a complex of different forms of mimicry.

ACOUSTIC EMISSION

First British Symposium

from a Correspondent

ALTHOUGH the role of acoustic emission in determining the size and location of earthquakes is well known, its potential for monitoring the behaviour of materials and engineering structures has only recently become widely appreciated. The feeble stress waves generated in materials by processes such as cracking and dislocation movement may be amplified, detected and recorded to provide the basis of a very powerful non-destructive testing tool. To find out what acoustic emission is all about and what it can do, an unexpectedly large number of people attended a meeting organized by the Institute of Physics on March 14 at Imperial College, London.

The two principal areas of application are in the field of materials research and non-destructive testing of large engineering structures. In this last role the technique has already been used to examine large steel pressure vessels for the presence and actual location of cracks and defects. A system capable of providing such important information is computer-controlled and could cost from £35,000 upwards, and requires an operator with knowledge and ability in many branches of science and engineering, but the cost of catastrophic failure may frequently be inestimable.

In addition to the current applications which largely involve proof-testing pressure vessels, large gas pipes, and the like, the continuous surveillance of acoustic emissions from structures, mines, dams, earth and snow slopes will provide an early warning system which is badly needed. The ability to detect dynamic microscopic events in materials also provides a potentially useful experimental facility for measuring plastic deformation, microcracking, debonding of interfaces, hydrogen embrittlement and stress corrosion cracking, and this is becoming increasingly apparent to the materials scientist. The attention of a wide cross-section of the industrial community has been drawn towards the inherently attractive notion of listening to materials and structures "playing their own signature tunes", coupled with the potential power of the technique in so many applied problems.

There were a few contributions at the meeting on the technological implications of this technique and some detailed reports about the various aspects of detector design, noise problems, and materials research. Introductory lectures were given by Dr A. A. Pollock (Cambridge Consultants Ltd) and Dr H. Dunegan (Dunegan Research Corporation, California). Some flaw location systems and applications were described in detail by Dr D. Birchon (Admiralty Materials Laboratory, Poole) and Dr D. L. Parry (Jersey Nuclear Company, Washington). Dr G. J. Curtis (Non-Destructive Testing Centre, Harwell) presented some recent results of adhesion tests which use broad bandwidth transducers.

Acoustic emission is still a very young subject, especially in Britain, and this first symposium was essentially nothing more than a progress report. The problem is that it is frequently difficult to determine in which direction the subject is progressing and exactly what the "end product" is likely to look like. The level of research and development effort in Britain is certainly very small in comparison with the level of industrial interest, if that is to be gauged by the number of people attending this meeting. It has now been demonstrated that acoustic emission is something more than a scientific curiosity with many future developments and applications to be anticipated.