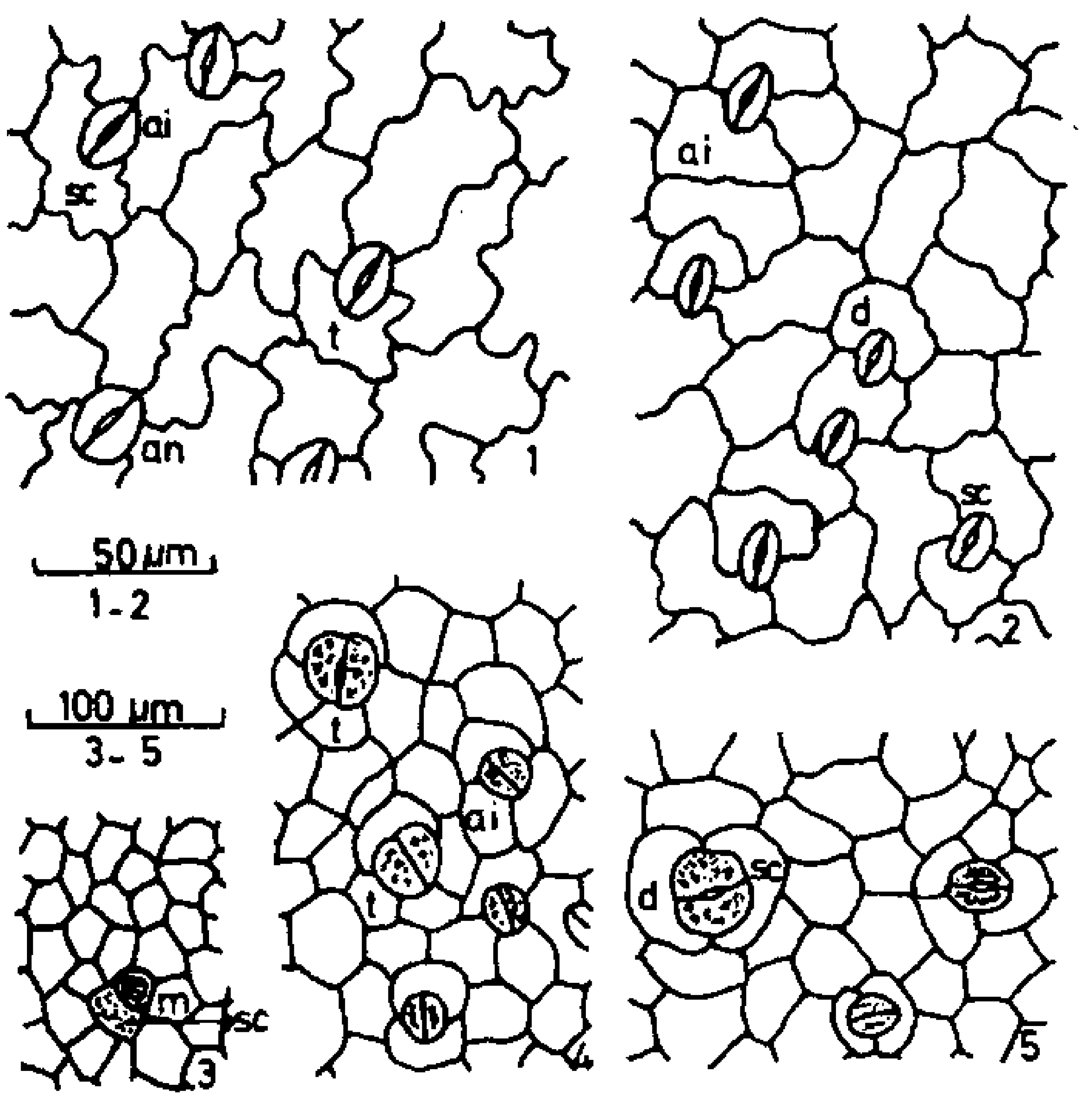

Figures. 1–5. Leaf epidermis of *Bacopa monnieri*. **1, 2.** Mature epidermis. **1.** Abaxial. **2.** Adaxial. **3–5.** Developmental stages of various stomatal types. (*ai*, anisocytic; *an*, anomocytic; *d*, diacytic; *m*, meristemoid; *sc*, subsidiary cell; *t*, tetracytic stoma).

position, size and shape of these cells help us to distinguish them from the other epidermal cells. Since these stomata are directly derived from the meristemoids their development conforms to the perigenous type[1,2].

It is interesting to observe that all these four stomatal types result from the same type of meristemoid depending upon how the protodermal cell cuts off the meristemoid. Frequently the new wall of the protodermal cell interesects the mother wall beyond two lateral walls or on either side of one of the walls of adjacent cell present on the polar side (figure 3). In the former case the meristemoid is flanked by two polar and two lateral cells. In the latter case the meristemoid is encircled by two lateral cells besides one polar cell mostly. Rarely the two intersecting points of this new wall are within two lateral walls of the polar neighbouring cell (figures 4–5). Here the meristemoid is completely enclosed by two polar cells whose common walls lie at right angles to the long axis of guard cells. Sometimes these intersecting points are beyond two adjacent cells resulting in anomocytic stomata with at least five encircling cells.

Of the stomatal types described above, anomocytic ones were recorded earlier under the name 'aperigenous type'[2]. Dia- and anisocytic stomata of perigenous origin were reported in *Trachyspermum ammi*[1]. The present study brings out for the first time the occurrence of tetra-perigenous stomata in *B. monnieri*. Secondly it establishes the possibility that stomatal diversity may also be due to the difference in the nature of intersection of the wall of the protodermal cell cutting off the meristemoid. Further work is in progress to ascertain whether these ontogenetic types of stomata characterize the family, Scrophulariaceae.

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DISTRIBUTION OF SONIFIC MUSCLES IN SOME SCIAENID FISHES AND ITS SEX-RELATED SEASONAL VARIATIONS IN *KATHALA AXILLARIS* [CUVIER]

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THE capacity for sound production in fishes has been well documented[1–7]. In sciaenids, sound production involves vibrations of sonific muscles of the swimbladder[1]. The sonific muscles, compressed, broad and located laterally near the body wall (ventrolateral to the viscera and swimbladder), are either present in both the sexes or in males only[8,9]. But variations in sonific muscles related to sex, stage of sexual maturity and season, have not been examined in Indian sciaenids. In the present communication the distribution of sonific muscles in various sciaenids, along with their seasonal and sex related variations, in *Kathala axillaris*, is described.

Specimens were drawn randomly from the commercial trawl catches of Porto Novo during Oct. 77–Sept. 79. Fresh specimens of *K. axillaris*, *Pennahia macrophthalmus*, *Otolithes ruber*, *Dendrophysa russelli*, *Nibea maculata*, *N. soldado*, *Johnius carutta* and *J. macropterus* were brought to the laboratory and measured, weighed, sexed and the stage of maturity determined following the general description of Passoupathy[9]. The sonific muscles were then extracted and weighed (± 0.001 g). Sonific muscle-body weight index, defined as the per cent ratio of sonific muscle weight to total fish weight, was calculated for each fish.

The sonific muscles were found to be present in both sexes in *P. macrophthalmus*, *N. maculata*, *N. soldado*, *J. carutta* and *J. macropterus*. But in *K. axillaris*, *O. ruber* and *D. russelli* they were seen to be restricted to males only. The sonific muscle-body weight indices for the males of *P. macrophthalmus*, *D. russelli*, *J. carutta* and *J. macropterus* were very high, when compared to the indices for the males of *K. axillaris*, *O. ruber*, *N. maculata* and *N. soldado*. In *P. macrophthalmus*, *N. maculata*, *N. soldado*, *J. carutta* and *J. macropterus*, where the sonific muscles are present in both sexes, the indices for males were always quite high compared to females (figure 1). Takita[10] has also reported previously that, in *Nibea mitsukurii*, the weight of these muscles relative to the body weight was greater in males than in females.

In *K. axillaris*, variations in the sonific muscle-body weight index during different stages of maturity could be noticed (figure 2). The index, lowest in immature (stage I) fishes, was seen to increase in maturing fishes (stage II), reaching a peak in fully mature fishes (stage III). In spent individuals (stage IV) a decrease in the index value was apparent, because of the reduction in the size of the muscle after spawning. A similar finding has been reported in haddock *Melanogrammus aeglefinus*[11]. The mean indices were higher from March to July, which happened to be the spawning season of this species[9]. A steep decline in the index could be recorded after June, when spent and immature fishes were abundant (figure 3). The findings of the present study indicate that in *K. axillaris*, the sonific muscles increased in size during breeding attaining the maximum size in mature fishes, while they appear reduced in spent fishes. These facts point to the conclusion that the sonific muscles seem to help in sound production

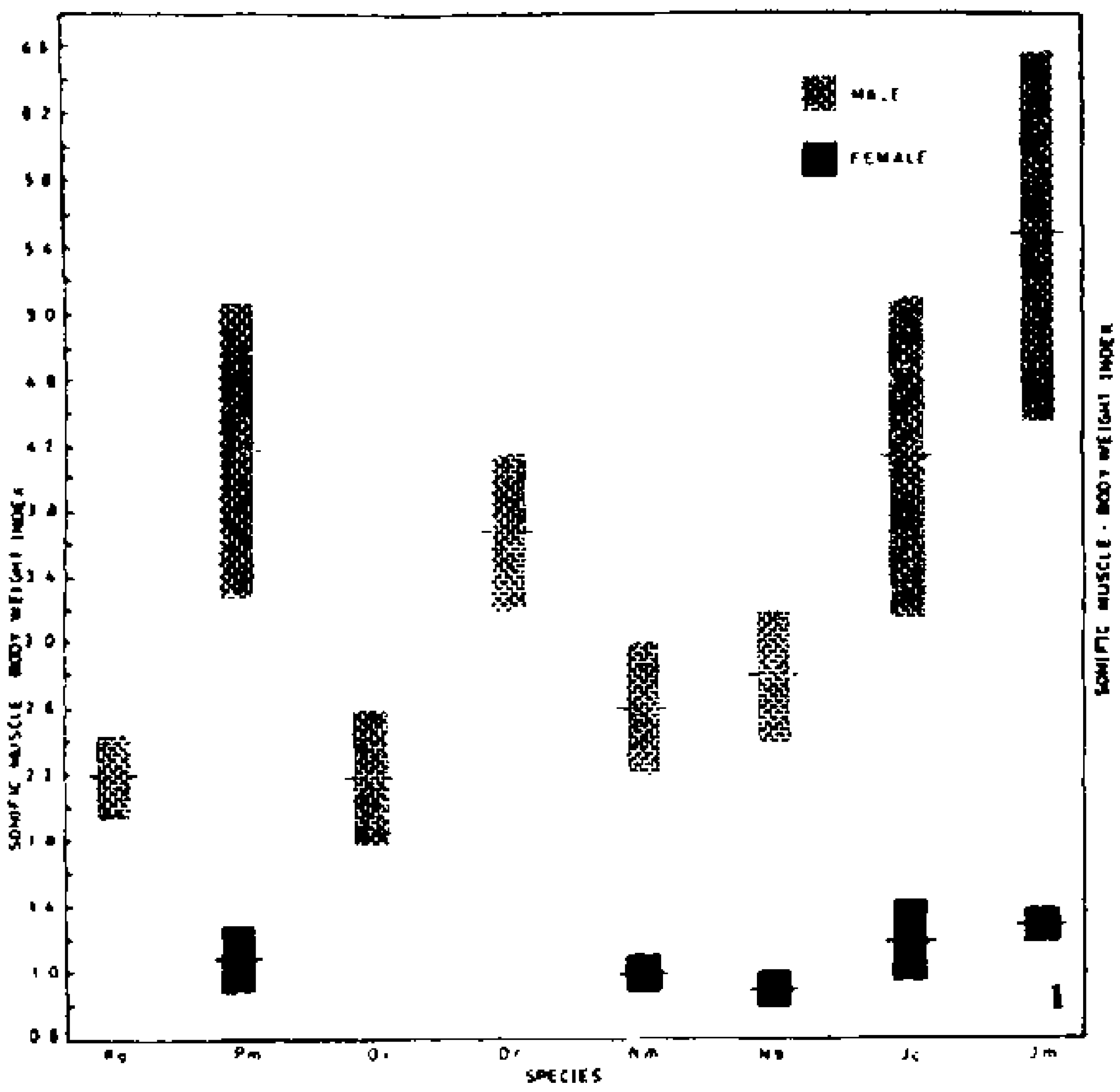

Figure 1. Sonific muscle-body weight indices in mature *K. axillaris* (Ka), *P. macrophthalmus* (Pm), *O. ruber* (Or), *D. Russelli* (Dr), *N. maculata* (Nm), *N. soldado* (Ns), *J. carutta* (Jc), and *J. macropterus* (Jm) (Horizontal line indicates mean and vertical bar indicates standard deviation).

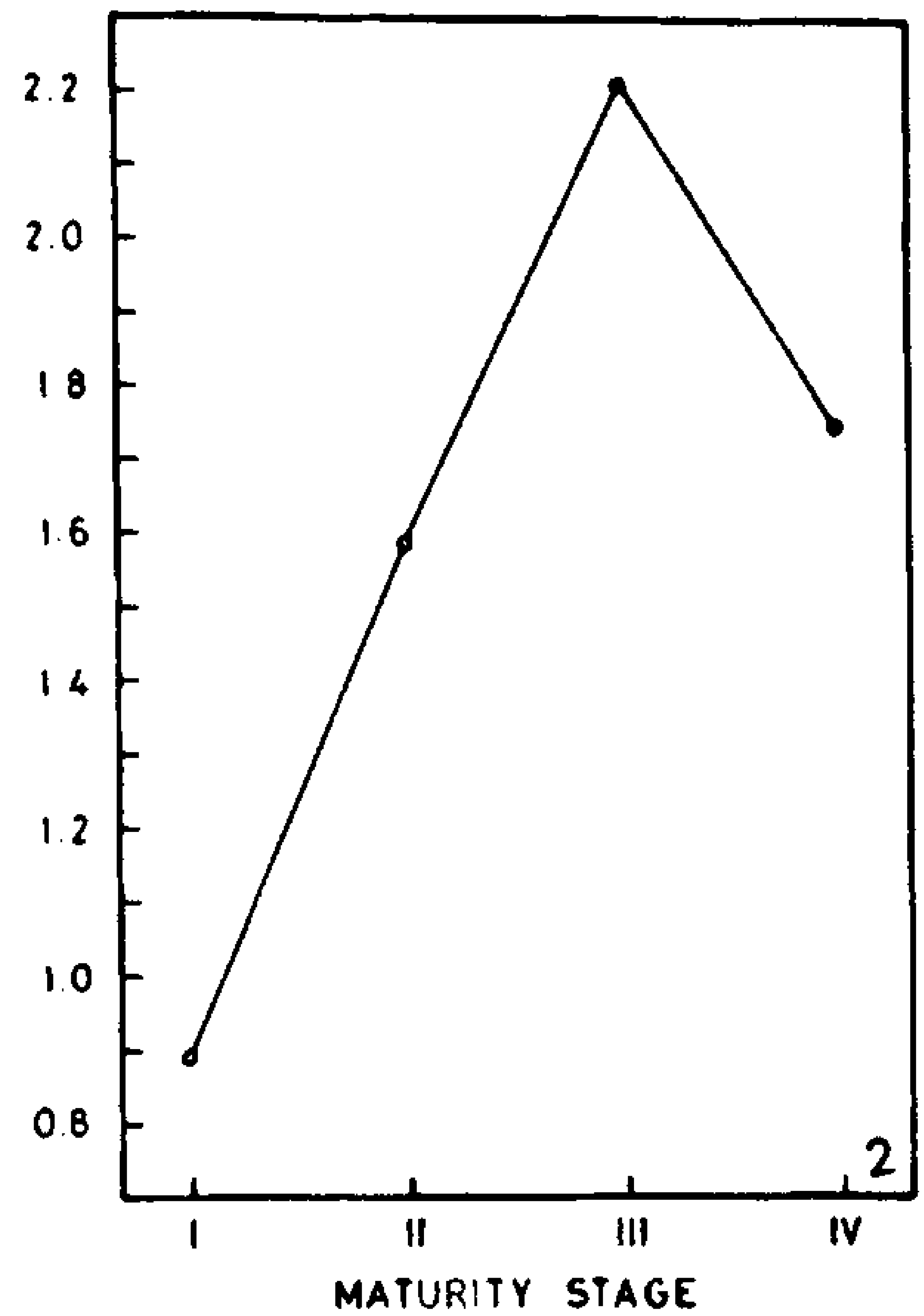

Figure 2. Variations of sonific muscle-body weight index during maturation in *K. axillaris*.

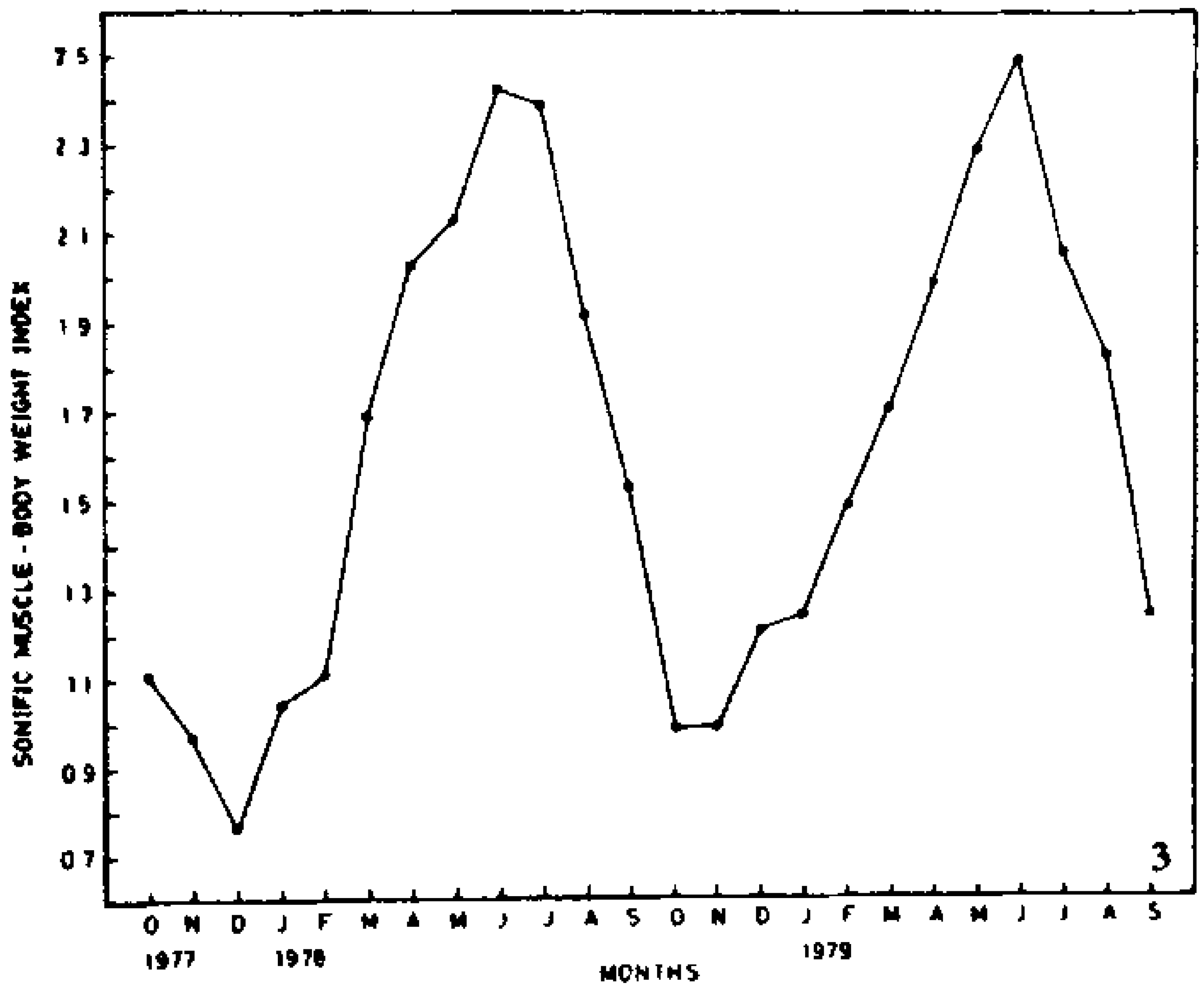

Figure 3. Monthly variations of sonific muscle-body weight index in *K. axillaris*.

mainly during breeding to bring out effectively in aggregation.

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EFFECTS OF A CHITIN INHIBITOR COMPOUND ON FECUNDITY AND EGG VIABILITY IN *ANOPHELES STEPHENSI* [LISTON]

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REPORTED in the present communication are the results showing the efficacy of A13-29054 (N-[(chlorophenyl) amino) carbanyl)-2,6-diflurobenzamide)]) in reducing the reproductive potential of *Anopheles stephensi*, a known vector of urban malaria.

Takeshi *et al*[1], Schaefer *et al*[2] and Post and Vincent[3] have earlier reported the interference of several insect growth regulators with the egg hatching of mosquitoes.

A colony of *A. stephensi* was maintained in the laboratory at 28 ± 2°C and 70–80% humidity and with a photoperiod of LD 10–14 hr. The compound was dissolved in acetone to obtain 1% (W/V) stock solution and the final concentrations of 0.001 to 0.0001 ppm (W/V) were prepared by adding the stock solution in the required volume of distilled water. Tween-80 was used as an emulsifier at the concentration of 0.02% (V/V) in the final test solution.

Early fourth instar larvae were collected from the rearing trays and treated with different concentrations of the compound. The control with acetone and Tween-80 treated larvae was also run. The pupae developed from larvae treated differently were removed to separate cages for hatching. Sexing of adults soon after their emergence was done.

Adults emerged out of the treated and the untreated larvae were crossed. Reciprocal crosses were also run for each concentration in the ratio of 1 ♂ : 1 ♀. Twenty-five pairs were kept together for each concentration. The females were given a blood-meal and the eggs were collected thrice during the oviposition period of 10 days. The number of eggs laid and the larvae hatched out were recorded for each group.

The compound A13-29054 causes a dose-dependent reduction in the reproductive potential of the adults emerged from treated fourth instar larvae. The compound affects the reproductive capability of females, only at the highest concentrations tested (0.001 ppm and 0.0005 ppm) as is evident by reduction in the production of eggs (table 1). A maximum reduction in egg-laying (28.6%) was observed when the males emerged from treated larvae were crossed with the females, emerged from untreated larvae. This indicates