easily soluble in ordinary solvents (50 mg), $[\alpha]_D$ — 50° (pyridine). Acid hydrolysis gave $\beta$-sitosterol and D-glucose. Permethylation of compound F by Hakomori's method and subsequent hydrolysis by Kiliani's reagent (HCl : AcOH : $H_2O$ ; 1 : 3·5 : 5·5) gave $\beta$-sitosterol and 2, 3, 4, 6-tetra-O-methyl D-glucose. Enzymatic hydrolysis with emulsin showed $\beta$-linkage. The compound was identified as $\beta$-sitosterol-$\beta$-D-glucoside.

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## METABOLISM IN *MYTILOPSIS SALLEI* (RECLUZ) (PELECYPODA): INFLUENCE OF TEMPERATURE

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THE inter-tidal zone experiences to a great degree the vicissitudes of terrestrial climate and at low tide zone the marine animals are subjected to a wide range of temperature fluctuations. Ghiretti[1] observed that the metabolic rate is generally related to temperature in molluscs as in other poikilotherms. The effect of temperature on the respiration of many molluscs has been studied earlier[2-8]. However, studies on the effect of temperature on bivalves appear to have received limited attention[6,9].

*Mytilopsis sallei* (Recluz) is a central American species which has migrated to Indian waters in recent years and has shown extensive propagation in local waters[10]. The animal has been found to withstand variations in salinities ranging from fresh water to 50% as determined earlier[11]. In the present studies, investigations were undertaken to examine the influence of temperature ranging from 5° C to 40° C on the metabolism of the bivalve *M. sallei*.

### Material and Methods

The experimental animals were collected from test panels exposed at the local harbour and were allowed to acclimatise overnight in the laboratory. Healthy animals of various size groups were then selected and taken in respiratory chambers individually[12]. The experiments on the respiration of the animals were conducted at various controlled temperatures ranging from 5° C to 40° C at every five degree interval. It was ensured that the seawater temperature in the experimental jars was brought to the required level prior to the beginning of the experiment. The respiratory chambers containing individual animals were then flushed with nitrogen to remove any oxygen. A series of experiments were conducted at each temperature and the minimal and maximal rates of respiration were determined. This was regarded as the index of active and standard rates of metabolism[13]. Fresh lot of animals previously acclimatised in the laboratory were selected for each temperature.

### Results

The metabolic rate was calculated from the following formula[14] :

$$Y' = aX^{b'}$$

where $Y'$ = the respiration rate $(Y/X)$
$X$ = the body weight
$a$ = constant
and $b'$ = the specific exponent of weight ($b$-1).

A calculated regression line of the metabolic rates (both standard and active) in relation to body size has been drawn for each temperature level on a double log scale as shown in Fig. 1. The effect of temperature on animals of 100 mg body weight has been reconstructed from Fig. 1 and drawn on a semilogarithmic scale (Fig. 2). On the basis of standard and active metabolic rates determined earlier, scope of activity at different temperatures examined has also been determined (Fig. 3).

It may be observed from the results (Fig. 1) that the value of $b$ varies with temperature in the mussel *M. sallei*. The slope of regression correspondingly varied with temperature both for active and standard metabolic rate. The standard rate of metabolism appeared to show a general trend, increasing with increase in temperature. The active rate, on the other hand, showed a variable response to temperature and apparently no general pattern could be observed. The active rate was generally higher at 5° C, 15° C and 30° C. The active rate of metabolism, however, decreased beyond 30° C. The scope of activity as shown in Fig. 3 indicates clearly that the maximum activity of these species is recorded at 15° C. Although another peak was

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also obtained at 30° C, the scope here was much less than that of 15° C.

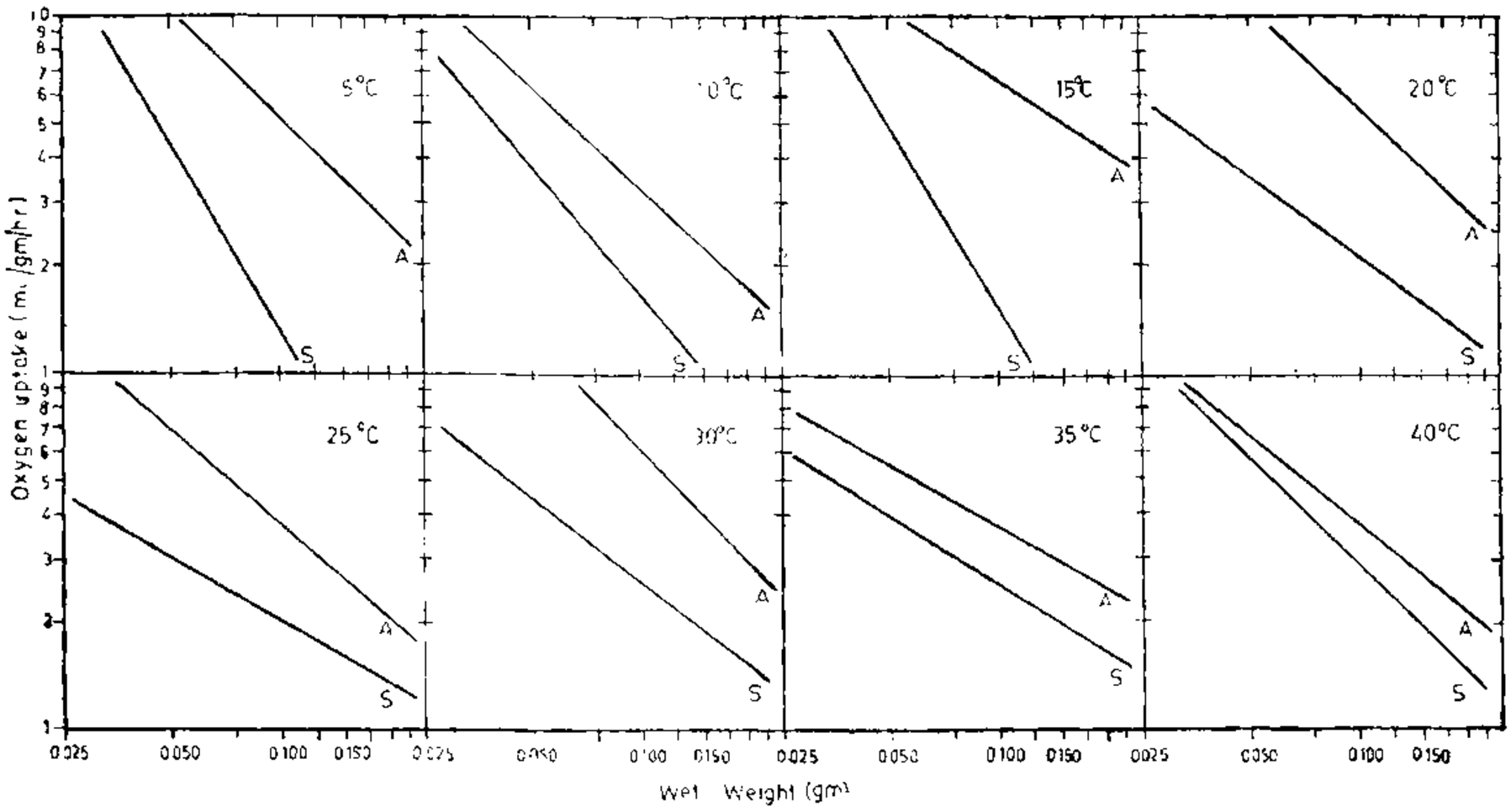


FIG. 1. Active (A) and standard (S) metabolic rates of *Mytilopsis sallei* in relation to body size at different temperatures.

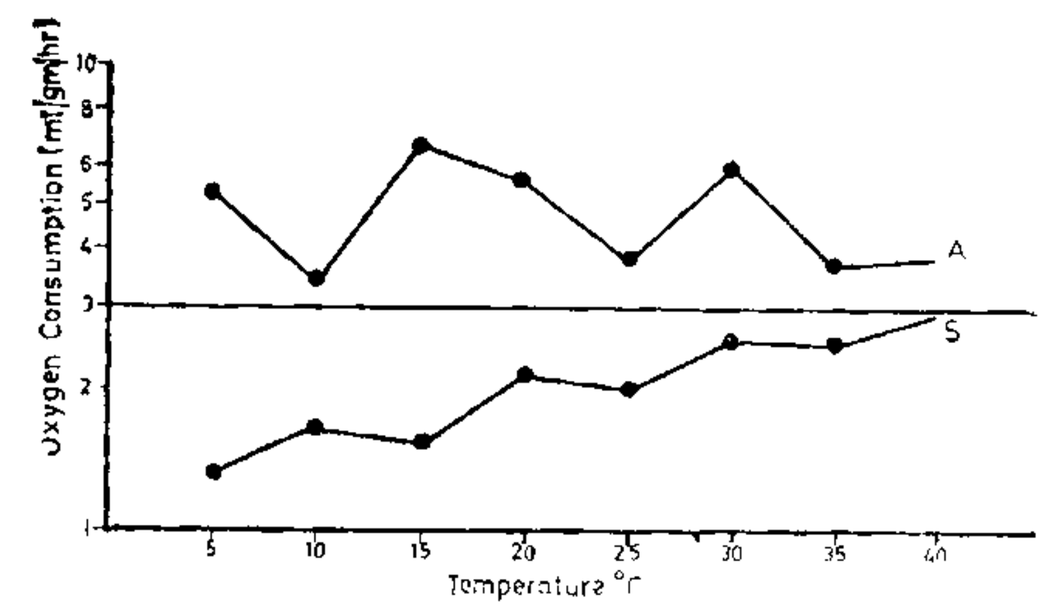


FIG. 2. The effect of temperature on the 100 mg size animal—reconstructed.

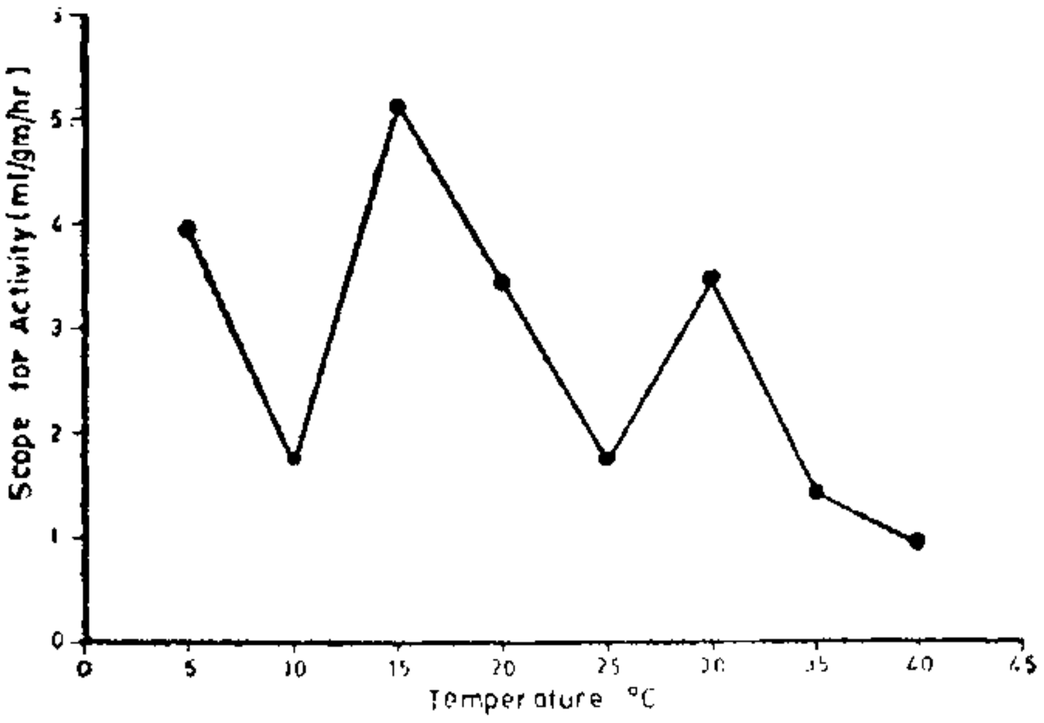


FIG. 3. Influence of temperature on the scope for activity.

## DISCUSSION

It may be observed from the results that the metabolism in *M. sallei* remains generally unaffected by temperature changes. The basal rate of metabolism, however, showed a trend towards an increase with increase in temperature. The active rate on the other hand showed fairly wide fluctuations at different temperature. Similar fluctuations in the active rate of metabolism have also been recorded earlier for *Mytilus edulis* and *Littorina littorea*[9].

The effect of temperature on active and standard rates of respiration of a wide variety of inter-tidal invertebrates have been studied earlier[13,15] and extensively reviewed by Newell[16]. In many species the temperature affected the active rate of oxygen consumption to a much greater extent than the standard rate and the rate of active metabolism increased with increase in temperature upto a certain level[8,17]. Barcroft[18] and Bullock[19] on the other hand have demonstrated that the metabolism does not increase regularly with temperature. The scope of activity, being the difference between the active and standard rate, does not appear to follow any uniform pattern in the case of *M. sallei* and in fact is comparatively more at lower temperatures than at higher temperatures.

The significance of this temperature-independent metabolism has been discussed in detail by Barcroft[18], Bullock[19], Davies[14] and recently by Newell and Northcroft[13]. It is generally agreed that the relatively undisturbed metabolism over a range of temperatures would indicate an important homeostatic mechanism in a poikilotherm and that this would allow the rates of metabolic reactions to proceed at a relatively constant rate despite the fluctuations in environmental temperature in the intertidal zone.

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## EFFECT OF IONIZING RADIATION ON SEED GERMINATION OF *PASSIFLORA* SPECIES

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THE recent popularity of the genus *Passiflora*, because of its edible species, has attracted the attention not only of taxonomists but also of cytogeneticists. Of the 400 known species of *Passiflora*, about 50 to 60 bear edible fruits. Probably all these are indigenous to the American tropics. In most areas of the tropical and subtropical world where passion fruit is grown, the species *P. edulis* Sims. (purple passion fruit) predominates. Purple passion fruit, because of its high fruit quality is by far more popular in Australia, New Zealand, Brazil and S. Africa. In India it is known only in some parts. Besides the juice, purple passion fruit also contains vitamin A and niacin[1]. Commercial production of this fruit has limitations because of its susceptibility to common pests and diseases and intolerance to cold.

Seed germination percentage has been found to be very poor in *P. edulis* and to a certain extent in *P. foetida* Linn. Ionizing radiations could be of great importance as a means for removing the dormancy of the plant material, increasing the germination and germination energy of seeds, tubers and roots.

Seeds of *P. edulis* were obtained from Sims Park, Nilgiris and those of *P. foetida* were obtained from Agriculture and Fisheries Department, Kowloon, Hong Kong. Seeds of both the species were surface sterilized before they were dispatched to BARC, Trombay, for irradiation. The irradiation treatment consisted of 12 levels of gamma rays ranging from 1 kr to 30 kr with 150 seed sample used per dose. The entire experiment was repeated twice and the mean was tabulated and given in Table I.

TABLE I

*Germination and survival percentage of* P. edulis *and* P. foetida *seeds irradiated with gamma rays. Data taken after 30 days of survival*

| Dose | *P. edulis* | | *P. foetida* | |
|---|---|---|---|---|
| | Germination % | Survival % | Germination % | Survival % |
| Control | 33·4 | 33·5 | 38·7 | 67·3 |
| 1 kr | 87·6 | 90·4 | 80·5 | 94·6 |
| 1·5 kr | 82·3 | 100·0 | 84·8 | 92·3 |
| 2 kr | 88·7 | 92·4 | 81·4 | 93·4 |
| 2·5 kr | 80·7 | 83·7 | 94·5 | 91·7 |
| 5 kr | 74·6 | 76·8 | 89·7 | 84·7 |
| 7·5 kr | 68·3 | 61·3 | 84·5 | 82·3 |
| 10 kr | 59·7 | 45·7 | 79·8 | 68·4 |
| 12·5 kr | 48·3 | 43·7 | 69·4 | 58·7 |
| 15 kr | 41·5 | 40·2 | 59·8 | 51·3 |
| 20 kr | 18·4 | 14·8 | 33·6 | 27·8 |
| 25 kr | 06·7 | 04·5 | 27·6 | 18·5 |
| 30 kr | 00·0 | 00·0 | 00·0 | 00·0 |

The irradiated seeds were sown within 24 hours, in pots together with the control seeds. Survival percentage for each dose was determined.

Table I indicates that the percentage of seed germination in both the species was found to have increased at lower doses over those of control but the survival percentage of seedlings increased considerably at lower doses ranging from 1 kr to