NOTES

DIURNAL OXYGEN-CURVE METHOD FOR STUDYING THE PRODUCTIVITY OF WATERS

QUITE A number of useful publications are available on the study of productivity of waters based on the 'light and dark bottle' method of Gaarder and Gran (1927) and the C^{14} method of Nielsen (1952). Odum (1958) has described a procedure for determining not only the 'productivity' but also the metabolism of water, including flowing waters and estuaries. This involves sampling the water for diurnal changes in dissolved oxygen and plotting the saturation of oxygen against the time of the day. Next, the rate of change of oxygen in mg/l/hr is plotted against the time of day. Correction for diffusion of oxygen is necessary and is carried out as follows :—

$$K = \frac{q_m - q_e}{S_m - S_e}$$

where K is the diffusion constant in mg/l/day at 0 per cent saturation (or 100 per cent 'deficit').

q_m = the rate of change of oxygen at a pre-dawn period in mg/l/hr.
q_e = the rate of change at a post-sunset period.
S_m = decimal saturation deficit at the time of q_m.
S_e = deficit at q_e.

The diurnal oxygen data for a temple tank 'Ayyankulam' in Tiruvannamalai (Madras) is treated below on the basis of graphs plotted in Fig. 1.

$S_m = 0.58$; $S_e = 0.61$; $q_m = 0.3$; $q_e = 1.60$.

$$K = \frac{(-0.3) - (-1.60)}{0.58 - (-0.61)} = \frac{1.3}{1.19} = 1.1$$

The 'saturation deficit' at each period has to be multiplied by the constant K and added to or subtracted from the rate of change curve (graphically) to correct for diffusion loss or gain. The corrected rate of change curve now represents 'community' metabolism, corrected for diffusion. This is indicated by the dashed (broken) curve in Fig. 1. 'Community respiration' is determined by drawing a smooth line through the dawn point to the lowest night point. The area lying between the respiration line and the zero rate of change line is the amount of respiration. Gross photosynthesis (Pg) is represented by the area between the respiration line and the daytime hump of the rate of change curve (dotted portion in Fig. 1). This, multiplied by the depth of euphotic zone (in this case 3.0 m.) would give the P in g $0_2/m^2$/day—(65 squares) (0.5 mg/l/sq) (3.0 m. depth) = 97.5 g. The community respiration is (62) (0.5) (3) = 93g/m^2 day. The 'day net' productivity (Copeland and Dorris 1962) of this tank is 15.0 mg/0_2/1. It is very interesting to note that the gross productivity reported here is much greater than that reported by Odum and Hoskins (1958) for various waters in the U.S.A. This is also higher than that for some oil refinery waste treatment ponds described by Copeland and Dorris (1962). A comparison of the Pg obtained by the diurnal oxygen method with the 'bottle' method shows that in the latter method Pg was only 32.2 g $0_2/m^2$/day, in

contrast to a value of 97.5 g/m²/day by the former method for the temple tank. This has been also the experience of Odum and Hoskins (1958, 1956). The highly productive nature of our temple tanks is evident from the data presented here which indicates they are functioning as efficient oxidation ponds.

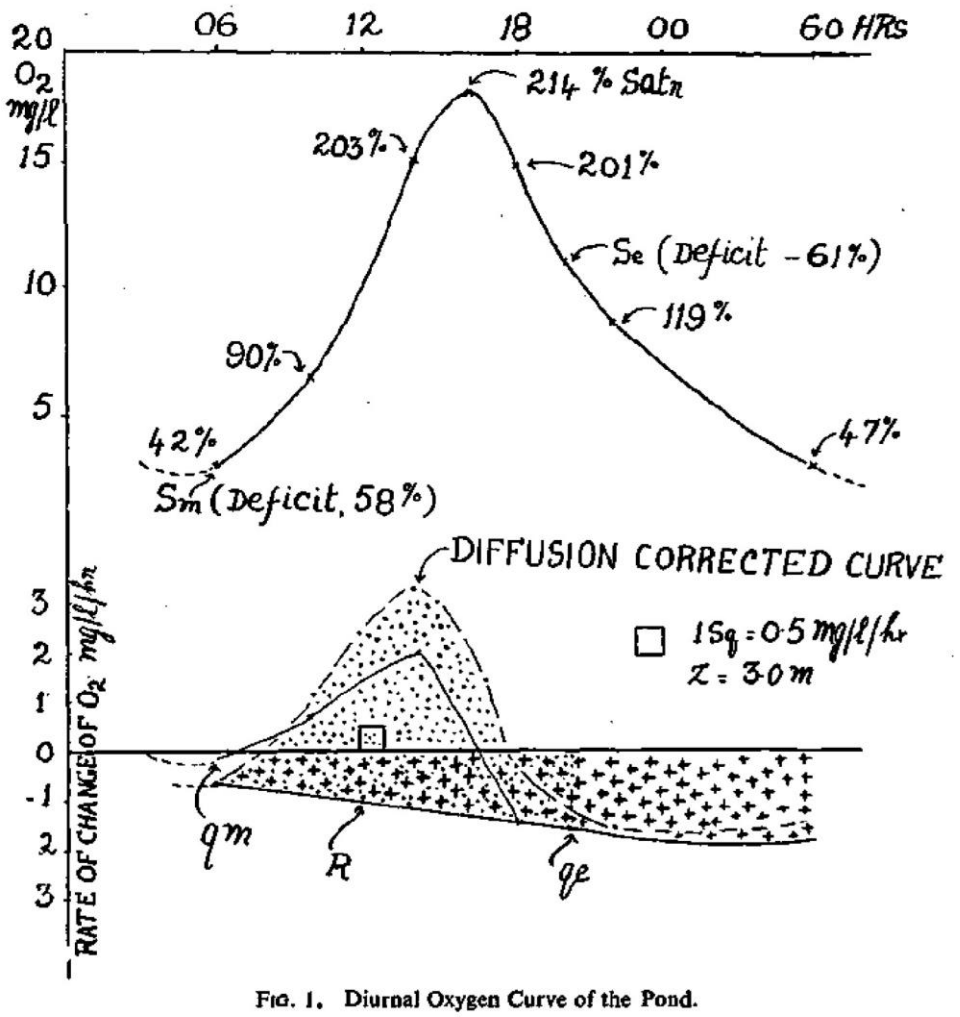

FIG. 1. Diurnal Oxygen Curve of the Pond.

It is suggested that the diurnal oxygen curve method be used to study the metabolism of shallow tropical aquatic ecosystems. My grateful thanks are due to Dr. Howard T. Odum for his helpful suggestions in the use of this method.

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ON THE OCCURRENCE OF *PODOPHTHALMUS VIGIL* (FABRICIUS) [DECAPODA : CRUSTACEA] ON THE WEST COAST OF INDIA

Podophthalmus Lamarck is the only genus recorded from the Indo-West-Pacific, of the subfamily Podophthalminae Borradaile and includes only two species namely *Podophthalmus vigil* (Fabricius) and *Podophthalmus nacreus* Alcock. The species *vigil* was created by Fabricius on the material collected by D.C. de Daldorff from the east coast of India. Perhaps due to the very rare occurrence of this species, it has not subsequently been reported from the Indian coast until 1962 when Premkumar (1962) came across a single male specimen from Sinnur which according to him 'appears to be the second (or possibly the first) record of the species from the Indian seas'. That this species has a fairly wide distribution in the Indo-West-Pacific is evident from the fact that this has been reported from Australia (Stephenson and Campbell, 1960), Red Sea (Shen, 1937), Iranian gulf (Stephenson, 1945), Formosa and Philippines to Hawaii (Shen, 1937; and Edmondson 1954).

While studying the biology of certain decapods from the south-west coast of India the author had opportunities to collect and examine six specimens of this interesting but rare portunid. Of the six specimens in the present collection five are males (carapace breadth including spines 54-61 mm.) and one female (47 mm.). The specimens were collected in the trawl nets operated at a depth of 20-27 fathoms off Cochin along with such other portunids as *Portunus* (*Portunus*) *sanguinolentus* (Herbst) and *Portunus* (*Portunus*) *pelagicus* (Linnaeus) and penaeids such as *Metapenaeus monoceros* Fabricius and *Metapenaeus affinis* (M.Edw.) during the period February to April 1964.

It may be noted that the comprehensive taxonomic studies on crabs reported by Pillai (1951) from Travancore coast and Chhapgar (1957) from the Bombay coast do not contain any mention of this genus which also suggest the rarity of this form.

Premkumar (1962) while recording this species from the east coast does not give any information either about the size of the specimen or about the depth from which it was obtained, while Stephenson and Campbell (1960) report this species comprising both males and females from the sandy mud and weedy habitat at a depth of 5-10 fathoms. The habitat of the specimens before me is deeper waters with a bottom of mud and debris off the Cochin Coast. The size of crabs in the present collection ranges from 47-61 mm. while those of Stephenson and Campbell's collection ranges from 55-142 mm. Whether the comparative smallness of these west coast forms is due to immaturity or due to smallness in size of the tropical forms when compared to those of the Australian waters is not evident. The collec-