

### A NOTE ON THE INHERITANCE OF BETACAROTENE CONTENT IN SORGHUM

GRAIN *Sorghums* constitute a large portion of human diet in India and Africa. They are predominantly used for cattle and poultry feed in other countries. Most commercial varieties and hybrids available possess white endosperm in which carotene is absent. Vitamin A deficiency is seen in new-born babies, sometimes to the extent of born blindness if mother's diet constitutes *Sorghum* without supplementation. The discovery of yellow endosperm grain *Sorghums* in Nigeria enables incorporation of carotene, the precursor of vitamin A, in the varieties and hybrids of *Sorghum* grown extensively.

Blessin, Van Etten and Wiebel<sup>1</sup> reported that *Sorghums* originating from crosses made with African yellow endosperm varieties contained carotenoids as high as 8 to 9 ppm. The major carotenoids present were identified as lutein, zeaxanthin and  $\beta$ -carotene. Worzella, Khalidy, Badawi and Dagher<sup>3</sup> studied the inheritance of  $\beta$ -carotene content in the grain of eight *Sorghum* crosses. The betacarotene in the grain of the parents varied from 0.22 to an average of 3.23 milligrams per kilogram. The  $F_2$  segregates generally fell between the parental limits. However, there was a preponderance of segregates with a  $\beta$ -carotene content lower than the mid-parent value. They concluded that relatively few genes are involved in the inheritance of  $\beta$ -carotene content in grain *Sorghum*. In the present study, an attempt is made to determine the type of gene action for total yellow pigment content in grain *Sorghum* from crosses between strains varying widely for this character.

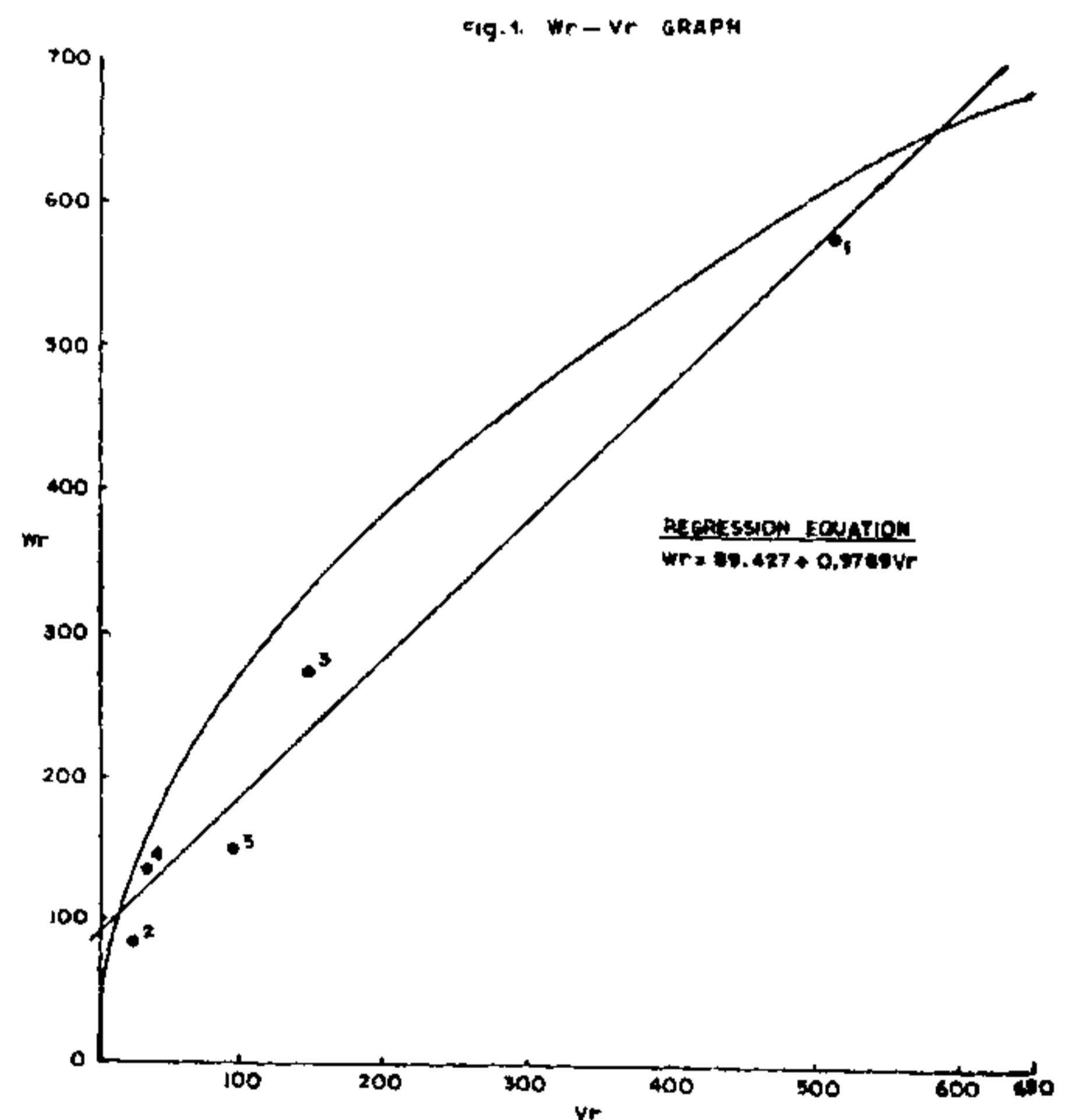
A full diallel set of crosses was made between five inbred lines of *Sorghum* which varied for total yellow pigments. Parents were chosen on the basis of appearance of endosperm colour. The parents and  $F_1$  hybrids were sown in summer 1968 at IARI Regional Research Centre, Rajendranagar, in single rows. The individual plant was considered as single replication. Each analysis in each replication is based on three samples. Since it is known that there is a high correlation between  $\beta$ -carotene content and total yellow pigments, estimation of total yellow pigments was taken as a criterion for  $\beta$ -carotene content. The  $F_2$  seeds from each of the  $F_1$  hybrids and parental selfed seeds were

analysed for total yellow pigments. Yellow pigments from 2 gm. of powder of grains were extracted by petroleum ether + acetone mixture (1:1) for 18 hr. in the dark and the filtrate (volume made upto 10 ml. by adding petroleum ether + acetone mixture) was read in Klett Summerson's photoelectric colorimeter using blue filter. Graphical analysis of the data as suggested by Jinks<sup>2</sup> was attempted.

Average colorimeter readings for total yellow pigments in 2 gm. of grains of selfed seed of parents and  $F_1$  hybrids are presented in Table I and the Vr-Wr graphs in Fig. 1.

TABLE I

Parents	IS 511	IS 1601-B	IS 3691	IS 8622	IS 85 (11)
IS 511 ..	79.5	23.5	38.3	25.7	39.7
IS 1601-B ..		18.7	20.0	17.0	29.3
IS 3691 ..			24.8	13.5	41.5
IS 8622 ..				11.7	24.7
IS 84 (11)					48.5



The distances between the points on the graph indicate that there is substantial genetic diversity among the parents. The regression line has a slope of approximately one ( $b = 0.9789$ ) indicating that the gene effects are of the additive type without much interaction. The

interception of the regression line shows absence of dominance. The results suggest that selection for  $\beta$ -carotene content could be highly effective, and lines with pro-vitamin A activity, which could be of significance in human as well as in animal nutrition, could be isolated.

The authors are thankful to the Director, Nutrition Research Laboratory, Hyderabad, for providing facilities for chemical analysis.

IARI Regional Res. Station, D. L. SINGHANIA,  
Rajendranagar, N. G. P. RAO.  
Hyderabad-30, L. R. HOUSE.  
August 19, 1970.

1. Blessin, C. W., Van Etten, C. H. and Wiebe, *Cereal Chem.*, 1958, **35**, 359.
2. Jankas, J. L., *Genetics*, 1954, **39**, 767.
3. Worzella, W. W., Khalidy, R., Badawi, Y. and Dagher, S., *Crop. Sci.*, 1965, **5**, 591.

#### AN INSTANCE OF THE OCCURRENCE OF *CONCHODERMA VIRGATUM* (SPENGLER) ON *LERNAEENICUS* *HEMIRHAMPHI* KIRTISINGHE

*Conchoderma virgatum* is a cosmopolitan species of pedunculate cirripede epizoic on copepods of the genus *Pennella*<sup>1</sup> and also rarely attaching directly to fishes like *Tylosurus acus*,<sup>2</sup> *Diodon hystrix*,<sup>3,4</sup> species of *Mola*, *Gymnothorax favagineus*,<sup>5</sup> *Remora remora*, and *Istiophorus orientalis*.<sup>6</sup> There seems to be no record of this interesting cirripede attaching on to *Lernaeenicus hemirhamphi*, a very destructive parasite infesting the genus *Hemirhamphus* along the coasts of India.

From a collection of 178 specimens of *Hemirhamphus xanthopterus*, 532 specimens of *Lernaeenicus hemirhamphi* were removed of which seven were found to be infested with *Conchoderma virgatum*. The infestation was not severe since only eight cirripedes could be collected. The nature of distribution of *Conchoderma virgatum* on the host was as follows: Two young specimens were attached close to each other on the genital segment near the base of the two egg strings, two others were found attached to the abdomen of the copepod while the remaining four were large adults cementing on to the genital segment almost occluding the

genital opening (Fig. 1). The effect of this occlusion was particularly noteworthy in that there were no egg strings in these females.

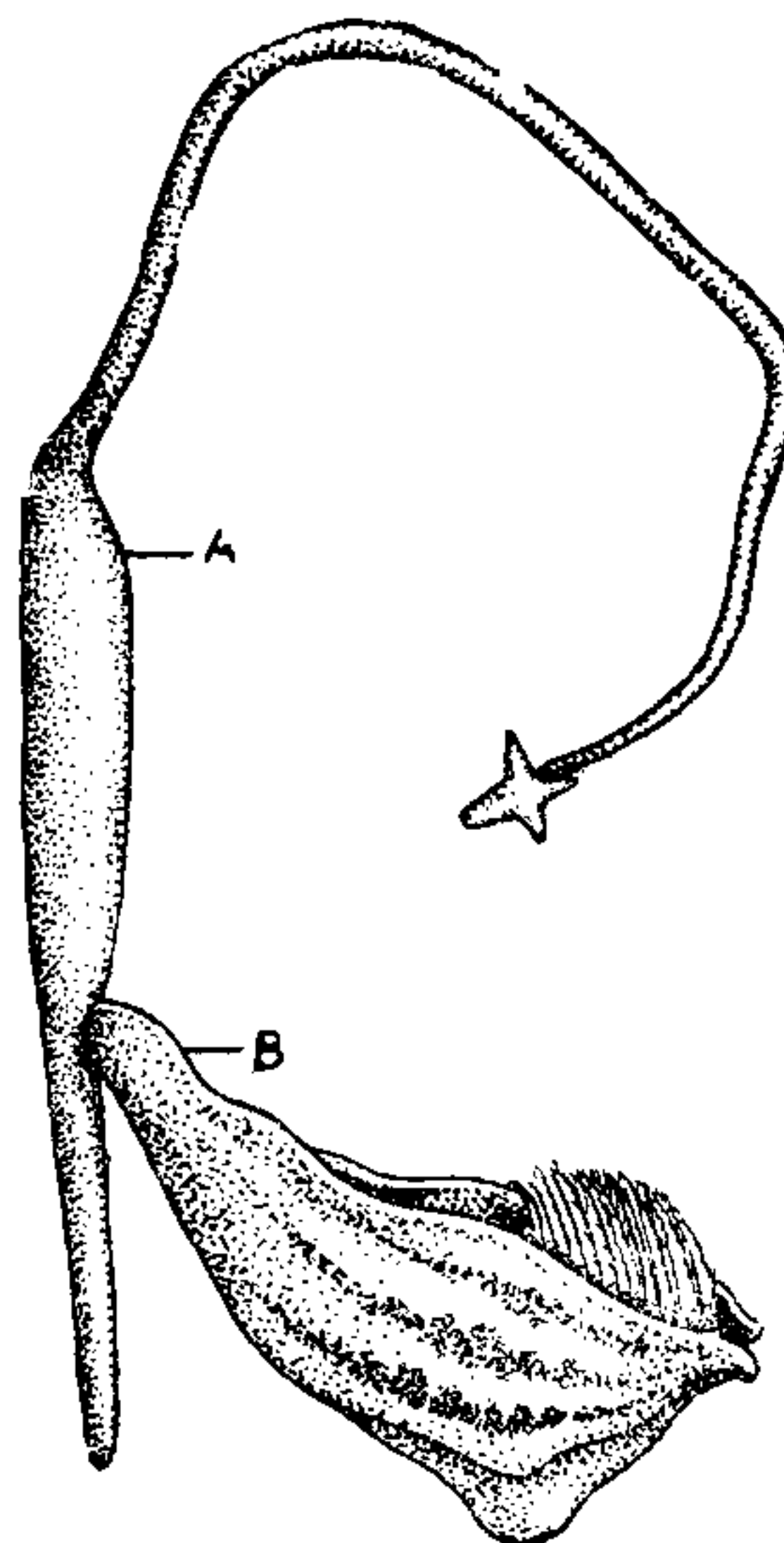


FIG. 1. *Lernaeenicus hemirhamphi* (A) infested by *Conchoderma virgatum* (B).

The region of attachment of the cirripede on to the body of the parasitic host showed indications of slight inflammation. Also one of the two specimens attaching to the genital segment had punctured the substratum with the result a part of the alimentary canal of the host has come out through the opening. These effects give an indication of the possible damage these epizoic forms are capable of inflicting on the host.

Marine Biological Lab., P. NATARAJAN.  
University of Kerala, N. BALAKRISHNAN NAIR.  
Trivandrum-7, August 4, 1970.

1. Daniel, A., *Bull. Mad. govt. Mus. nat. Hist.*, 1955, **6**, 1.
2. Sumner, F. B., Osburn, R. C. and Cole, L. J., *Bull. U.S. Bur. Fish.*, 1913, **31**, 245.
3. Crozier, L. J., *Amer. Natural.*, 1916, **50**, 636.
4. Balakrishnan, K. P., *Crustaceana*, 1969, **16**, 101.
5. Ciurea, J., Monod, T. and Dinulesco, G., *Bull. Inst. Oceanogr. Monaco.*, 1913, **615**, 1.
6. Jones, E. C., Rothschild, B. J. and Shomura, R. S., *Crustaceana*, 1968, **14**, 194.