with advancing age. It has been reported that Vitamin D production diminishes with age and may be associated with reduced shell calcification[7]. In the present study, the correlation between shell weight and calcium content was noted. This indicated that the shell weight is mainly dependent upon the amount of calcium present[8].

The authors thank Dr S. Veeran, Director, Veeran Veterinary Hospital for valuable guidance.

8 September 1986; Revised 18 October 1986

1. Taylor, L. W. and Martin, J. J., *Poult. Sci.*, 1928, **7**, 39.
2. Warren, D. C. and Schnepel, R. L., *Poult. Sci.*, 1940, **19**, 67.
3. McCance, R. A. and Shipp, H. L., *Special report, Med. Res. Council, Canada*, 1933, No. 187.
4. Ward, G. M. and Johnston, F. B., *Dept. Agr. Pub., Canada*, 1968, No. 1064.
5. Plimmer, R. A. A. and Lowndes, J., *Biochemistry*, 1924, **18**, 1163.
6. Romanoff, A. L., *Biol. Bull.*, 1929, **56**, 351.
7. Seares, J. H., *Poult. Guide*, 1983, **20**, 29.
8. Itoh, H. and Hatang, I., *Poult. Sci.*, 1964, **43**, 77.

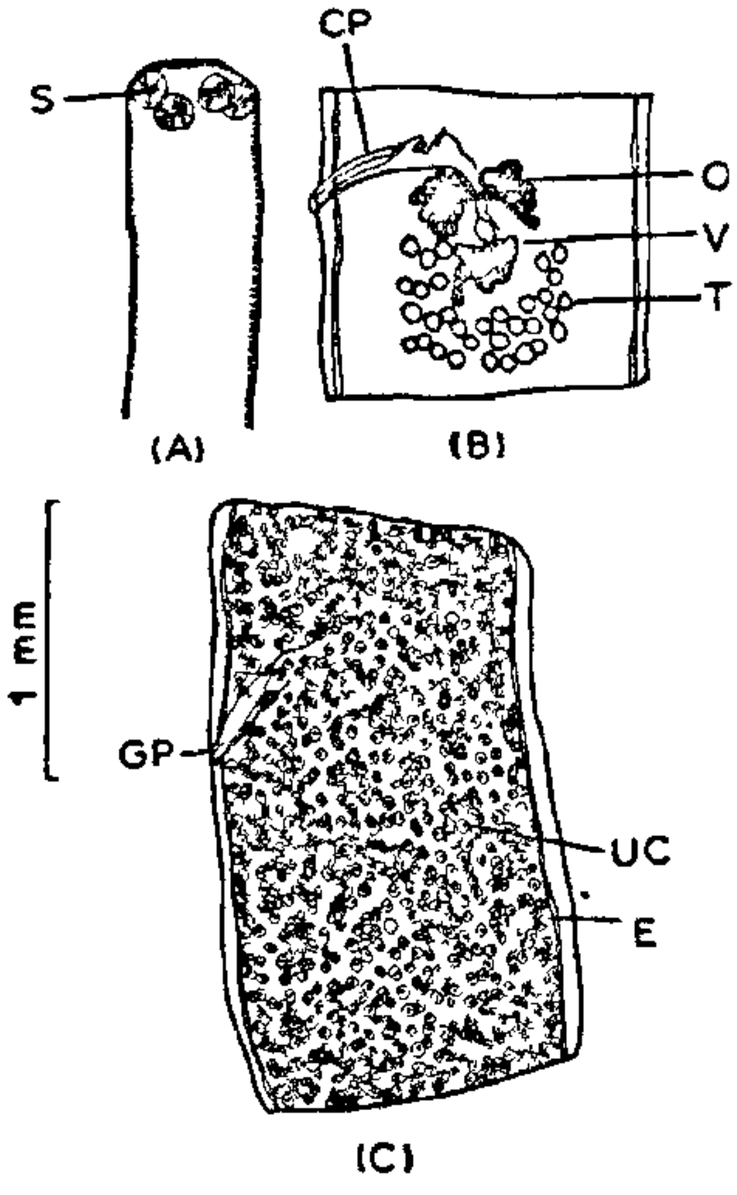

Figure 1. *Oochoristica americana.* **A.** Scolex; **B.** Mature segment; **C.** Gravid segment; S, sucker; GP, genital pore; T, testes; V, vitellarium; CP, Cirrus pouch; O, Ovary; UC, Uterine capsule; E, eggs.

ON THE OCCURRENCE OF *OOCHORISTICA AMERICANA* HARWOOD (CESTODA) FROM INDIA

A. L. DESHMUKH
Department of Zoology, Pratishthan Mahavidyalaya, Paithan 431 107, India.

THREE cestode worms were collected from the intestine of Russell's viper, *Vipera russelli* from Aurangabad, Maharashtra State, India. The detailed morphological studies revealed that the worms belong to the genus *Oochoristica* Luhe, 1898 and species *O. americana* (Harwood, 1932). *O. americana* was originally described from a snake, *Farancia abacura* of N. America. A review of the literature shows that so far *O. americana* has not been reported from India. This is therefore the first report of this species from India and represents a new host record for the species. A brief description of the species is presented below.

Oochoristica americana (figure 1)

Body 160–165 mm in length and 1.43–1.52 mm in maximum width. Scolex 0.41–0.55 mm in width. Suckers 0.11–0.13 × 0.13–0.14 mm in size. Genital pores irregularly alternating. Testes posterior and lateral to the vitellarium, 28–44 in each segment. Cirrus pouch 0.27–0.55 mm in length. Ovary bilobed, each lobe with 7–11 acini. Vitellarium medium, 0.13–0.20 × 0.21–0.26 mm in size. Each uterine capsule containing single egg. Uterine capsule 0.049–0.060 mm in diameter, while oncosphere 0.022–0.027 mm in diameter.

The genus *Oochoristica* is established by Luhe[1]. Hughes[2] and Spassky[3] provided keys to the species of the genus.

The present form, when compared with all the known species of the genus *Oochoristica*, comes closer to *O. americana*[4] in the number and distribution of testes. Moreover, it also resembles in the size of scolex and suckers and the length of cirrus pouch. The present form differs from *O. americana* only in a few morphometric variations which are considered as intra-specific. It is redescribed here as it represents a first record of the species from India and also it is a new host record.

The author is thankful to Principal R. B. Walle for encouragement and to Prof. S. D. Kalyankar, De-

partment of Zoology, Marathwada University for guidance.

23 September 1986; Revised 20 October 1986

1. Luhe, M., *Zool. Anz.*, 1898, **21,** 650.
2. Hughes, R. C., *Am. Midland Natur.*, 1940, **23,** 368.
3. Spassky, A. A., *Essentials of cestodology* Academy of Sciences, USSR, Moscow, 1951, p. 1.
4. Harwood, D. P. D. *Proc. U. S. Nat. Mus.*, 1932, **81,** 1.

INDEPENDENT AND COMBINED ACTION OF CARBARYL AND PHENTHOATE ON SNAKE HEAD, *CHANNA PUNCTATUS* (BLOCH)

K. R. S. SAMBASIVA RAO and
J. CHANDRASEKHARA RAO*
Department of Zoology and Department of Botany, Nagarjuna University, Nagarjunanagar 522 510, India.*

FISH serves as a bio-indicator of water quality and this can easily be testified by its morphological, physical and behavioural changes in any altered environmental condition[1]. Since pesticides are known to affect the quality of water, this has a profound influence on the biochemical and physiological parameters, which also influence the behavioural patterns. Based on this, the present study aims to probe into some physical, morphological and behavioural changes in *Channa punctatus* exposed to sublethal concentrations of carbaryl (C) (1.49×10^4 M–in ppm : 3 ppm), phenthoate (P) (0.04×10^4 M–in ppm : 0.16 ppm) and their combination (C + P) (0.01×10^4 M–0.25 ppm). In our earlier study[2], it was observed that the C + P combination was found to exhibit markedly synergism (potentiation of toxicity during interaction). In C + P combination, though the concentration of both C and P is very low when compared to their corresponding individual pesticides, still exhibiting synergism, might be due to the manifestation of additive effect during interaction.

I. Physical changes

The body weight of the fish showed an insignificant decrease and the per cent water content showed no significant change in the fish exposed to C, P and C + P combination of pesticides. However, under C + P combination, the per cent change in these parameters was relatively greater than in individual exposures. The insignificant values obtained regarding these two parameters suggest the loss of some constituents other than water, probably ions, amino acids, amines etc which are known to function in the maintenance of ionic and osmotic balance[3].

II. Morphological changes

Colour: The skin colour of the normal fish is black or dark grey which becomes light grey under pesticide exposure. This is more conspicuous with C + P combination. The black spots on fins were found to fade predominantly under C + P combination.

Secretion of mucous: There is copious mucous secretion under pesticide exposure, particularly in C + P combination. If secretion of mucous is regarded as a defense response, the high amount of mucous secretion in C + P exposed fish can be attributed due to the manifestation of additive effect. It is likely that the secretion of mucous may help in protecting vital organs like, gills against pesticide toxicity[4].

III. Behavioural changes

(a) Irregular, erratic and sometimes jerky movements were observed in the fish exposed to individual and combination of pesticides. Manifestation of this abnormal behavioural pattern is certainly a sign of pesticide toxicity which is greater under C + P combination. After 30–36 hr of exposure, the fish exhibits a peculiar behaviour of trying to jump out from the pesticide medium, which can be taken as an escape phenomenon.
(b) After 36–40 hr of exposure, the fish resorts to erratic swimming indicating loss of equilibrium. It is likely that the region in the brain which is associated with the maintenance of equilibrium should have been effected under the insecticidal impact. This strange phenomenon is greater under C + P combination, suggesting that the C + P combination would exhibit additive effect, indicating the manifestation of synergism.
(c) The frequency of surfacing phenomenon was greater under pesticidal exposure, wherein the fish frequently comes to water surface. This peculiar behaviour is more frequent in fish exposed to C + P combination (5–8 times/min) followed by phenthoate