total haploid genome length of 38·93 micra. Hence our data on the NF match those of Manna and Prasad[3] and deviate from those of Kaur and Srivastava[1] and Nayyar[2]. A genome length of 38·17 micra in the specimens studied by Manna and Prasad approximates that of the individuals studied by us, but the chromosome number in our specimens (*i.e.*, $2n = 46$) falls short by two from the diploid number reported by Manna and Prasad.

Since $2n = 46$ can be derived with ease from $2n = 48$ by way of fusion of two pairs of telocentrics, these two forms, differing in their diploid number, can be races of the same species, or, what is more credible, the form studied by us may be a subspecies of the form studied by Manna and Prasad. On the contrary, these two forms could as well be two different species or might be representing an instance of chromosome number polymorphism by the same species. That is, the simple fusion of two pairs of chromosomes of one form has brought down the chromosome number in the other. A similar mechanism of fusion/fission has also been advocated for the variation of $2n$ from 32 to 48 in several species of the genus *Fundulus*[5].

In the evolution of karyotypes among fishes, several arguments have been made in favour of fusion/fission as the underlying mechanism(s)[6–8]. According to Chen[5] and Liepmann and Hubbs[9], fusion always leads to a decrease in the chromosome number and, therefore, the teleosts, as they progress phylogenetically more often come to show a decrease than an increase in their chromosome number. Judged by these postulates, the form studied by us, although has nearly the same genome length as the form studied by Manna and Prasad, could yet be evolutionarily a more recent one.

December 9, 1980.

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LOG-NORMAL DISTRIBUTION OF PARASITIZATION INDEX AND GASTRO-PARASITIC INDEX IN THE FISH-CESTODE RELATIONSHIPS OF HILL-STREAM FISHES

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Logarithmic models relating to the cestode infection and body weight ratios of fish hosts and their cestode parasites have been proposed. The objective of the present investigation is to provide comprehensive information on the distribution patterns of cestode infected fish hosts in hill-streams at variable altitudes in Garhwal Himalayas. The precise role of fluctuations in the extremes of different environmental factors on species abundance of infected hosts is discussed. The data from a survey of 2224 fishes of 22 species in the Himalayan riverine ecosystem, *viz.*, 14, 1, 2, 1, 2, and 2 fishes of family Cyprinidae, Bagridae, Sisoridae, Saccobranchidae, Ophiocephalidae and Mastacembelidae respectively (see Malhotra[1]) have been used. A highly significant correlation ($P > 0 \cdot 01$) was obtained between Parasitization Index (P.I.) (Malhotra, Chauhan and Capoor[2]) and Gastro-Parasitic Index (G.P.I.) (Malhotra, Chauhan and Capoor[3]) for *Barilius bola* Ham. (Cyprinidae) and (*Mastacembelus armatus* Lac. (Mastacembelidae). The correlation was poor ($P > 0 \cdot 50$) for *Labeo dero* Ham. (Cyprinidae) and *Schizothorax plagiostomus* Heck. (Cyprinidae). Figs. 1*a*–1*c* and Figs. 2*a*–2*c* indicate log-normal distribution of the infected fish species in relation to P.I. and G.P.I. respectively at different altitudes (*viz.*, 395 mASL and 650 mASL) except for certain sample fluctuations in Figs. 1*b* and 1*c* for P.I. and Fig. 2*a* for G.P.I.

The log-normal distributions of infected fish species abundances (Figs. 1*a*–1*c* and Figs. Figs. 2*a*–2*c*) further confirm the views of Feller[4] that such distributions are typically the probable outcome of superimposing a number of random processes on each other so that they undergo "random walks". A general explanation in the present investigation lies perhaps in the unpredictability of the environment because to living things the environment fluctuates in ways that are hostile, both in time and space. Some species, the opportunists, meet the fluctuations in time merely by fluctuating their own abundances in a specified area during different times of the year. By the "random walk" process their relative abundances become log-normal. Other species can endure fluctua-

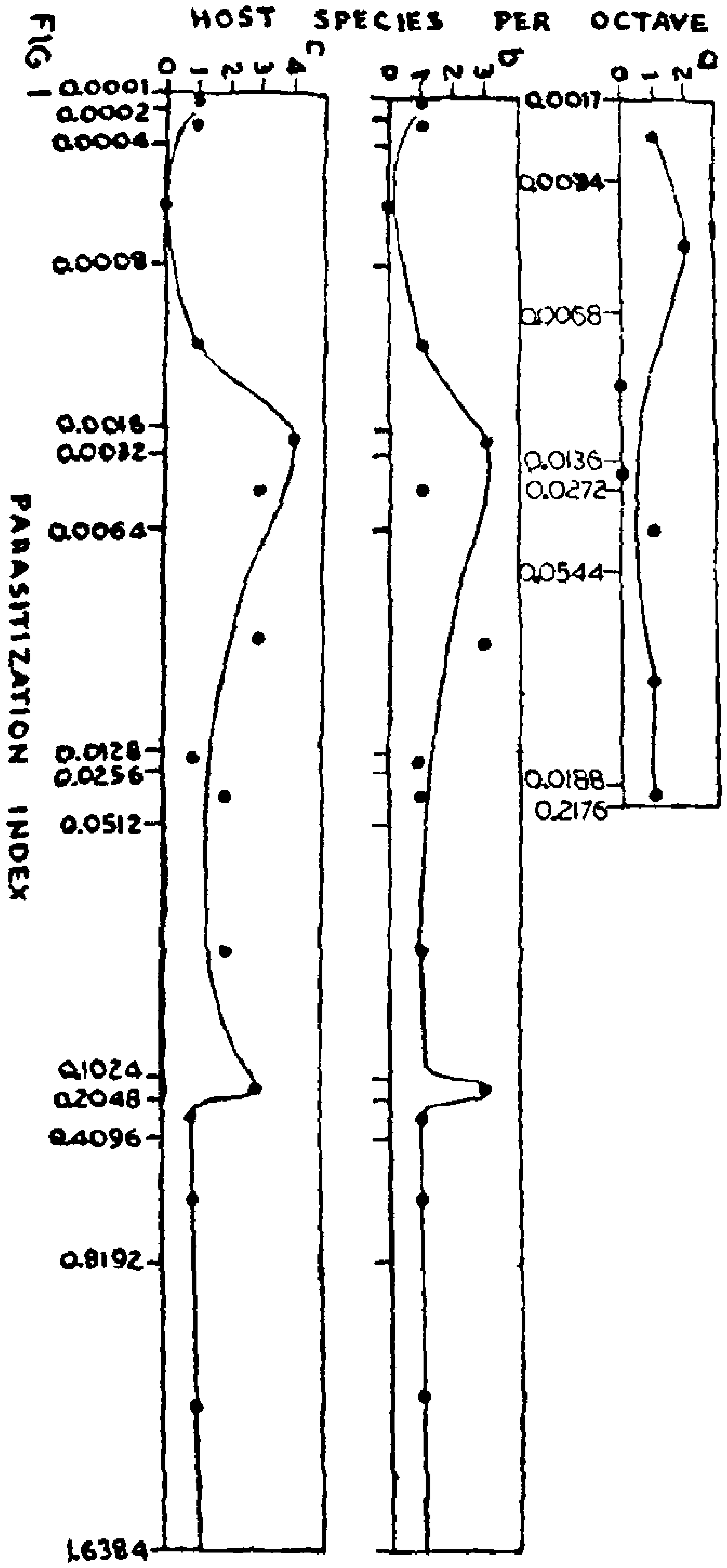

FIG. 1. Log-normal distribution of host species in relation to Parasitization Index at 395 mASL (*a*), 650 mASL (*b*) and overall (*c*).

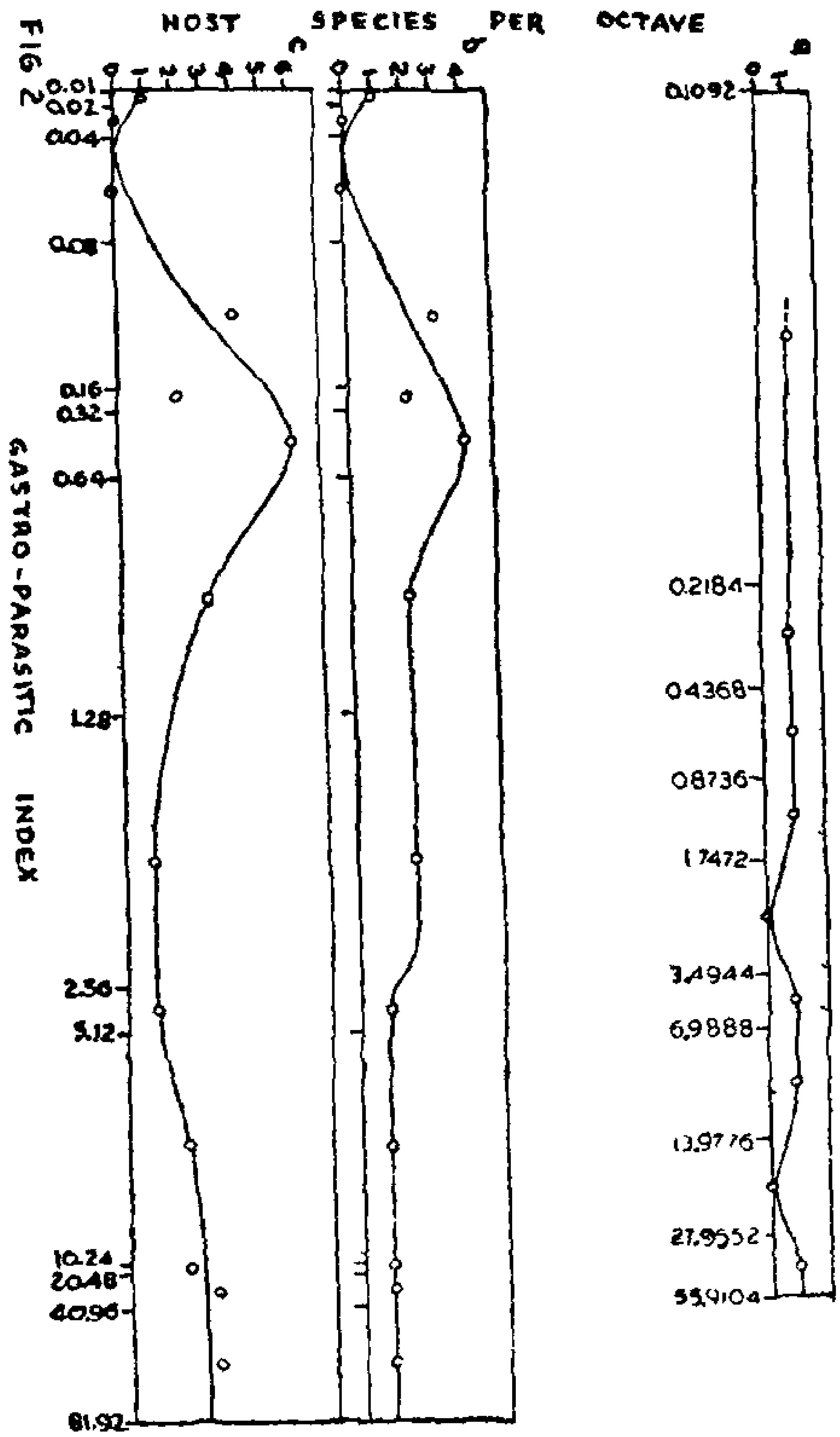

FIG. 2. Log-normal distribution of host species in relation to Gastro-Parasitic Index at 395 mASL (*a*), 650 mASL (*b*) and overall (*c*).

tions through time well enough to establish equilibrium populations. But their overall abundance is set by the fluctuations of the environment through space, *i.e.*, at differert altitudes during different seasons of the year. Their relative numbers differ from one altitude to the other, and the products of all these local abundances result in a log-normal distribution also.

April 7, 1981.

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