

Brackish Water Animals of the Gangetic Delta.

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ZOOLOGISTS in Calcutta have been often attracted by the interesting fauna of the Salt Lakes and the Deltaic region of the Ganges. Sixty-five years ago Stoliczka (1869) started researches on these animals which have been followed by Alcock, Annandale, Kemp, Sewell and other past and present officers of the Zoological Survey of India. The results of the researches of these workers are embodied in a series of short papers published in different journals. In the last number of the *Records of the Indian Museum* (36, pt. i, pp. 45-121, 12 figs., March 1934), Lt.-Col. R. B. S. Sewell, in his article entitled "A Study of the Fauna of the Salt Lakes, Calcutta", has not only brought together the results of all these researches, but has amplified them considerably by a study of the fauna both in the field and in the laboratory. Though Col. Sewell has dealt mainly with the plankton, with special reference to the Copepoda, in his general treatment of the subject he deals also with the wealth of information that has accumulated regarding other groups of animals.

The geography of the area investigated by the Calcutta zoologists is fully described and it is indicated that for several years past there has been a steady change in the conditions existing in and the general character of some of the rivers in Lower Bengal, and that these changes have had a profound effect on the Salt Lakes and the associated streams and thus indirectly on the general character of the fauna of certain areas. The waters of the Salt Lakes even in 1928 used to be fairly brackish (Salinity 9.60 per mille in February 1928) whereas now they are almost fresh (Salinity 2.20 per mille in February 1933). In consequence, a considerable change in the plankton fauna has been indicated by Sewell.

It is rightly pointed out that "The chief zoological interest in a brackish-water area such as that under consideration lies in the fact that it forms one of the main highways by which certain constituent elements of the marine fauna of the Indian Seas can encroach on and finally establish themselves in fresh water." The main physical factors that the animals have to contend with during the course of migration are: (i) change

in salinity, (ii) soft and shifting substratum, (iii) density of silt suspended in water, and (iv) for certain animal associations of this region, periodic desiccation due to tides and other causes. The biological factor, which possibly supplies a stimulus for migration, is the great increase in the available food supply that is found in the region of such estuaries. "The flow of the river brings down with it great quantities of vegetable debris and detritus, that are available as a source of food, and at the same time large quantities of nutrient salts, derived from the land, and poured out into the sea, result in a very large increase in the Diatom flora, that in turn also serves as a food supply for the smaller marine organisms." As there is a great variety of habitats and 'niches' in this environment, the fauna is fairly rich; but it has to be remembered that this environment is full of struggle and strife and demands a great deal of physiological and structural adaptability on the part of the animals inhabiting it. Structural modifications are mainly noticeable in the fish and Decapod crustacea, while striking changes in the physiology and general habits of all animals must have taken place as a measure of adaptation to the varying needs of this environment.

Lists of species in the various animal groups that are known to occur in the Gangetic Delta are given and though these lists are by no means complete, they provide valuable data for further work. A list of stations investigated and the salinity of water at each locality are given. Several new species of Copepods are described and there is an interesting section devoted to the origin of and changes in the Copepod fauna of the Delta. The estuarine fauna, according to Sewell, consists of three elements, marine, relict and freshwater. The majority of the animals that are found in this habitat are, no doubt, derived from the sea and with the exception of fish and other larger animals, specially crabs and prawns, the smaller animals seem to have been brought from the sea to the deltaic region, either as adults or as larvæ, by the action of the tides. Similarly during floods, freshwater animals are carried to these regions and gradually become acclimatised to higher salinity. Moreover,

"In times past, there can be but little doubt, that this region was actually a part of the Bay of Bengal and that with the gradual extension of the Delta seawards the water of the rivers and lakes gradually became less and less salt, though the actual process must have been extremely slow. A certain number of marine species that had established themselves within the area during the early stages of the formation of the Delta would doubtless be able to acclimatise themselves to the gradually changing conditions and thus equally be able to persist in

their original habitat and form a relict fauna."

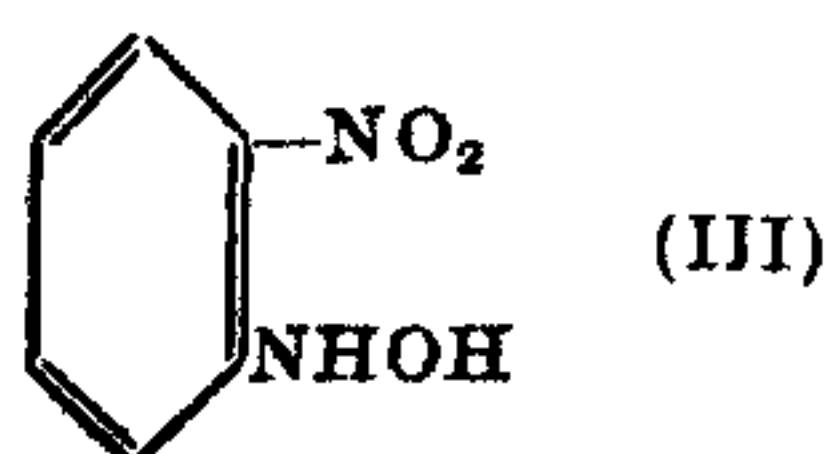
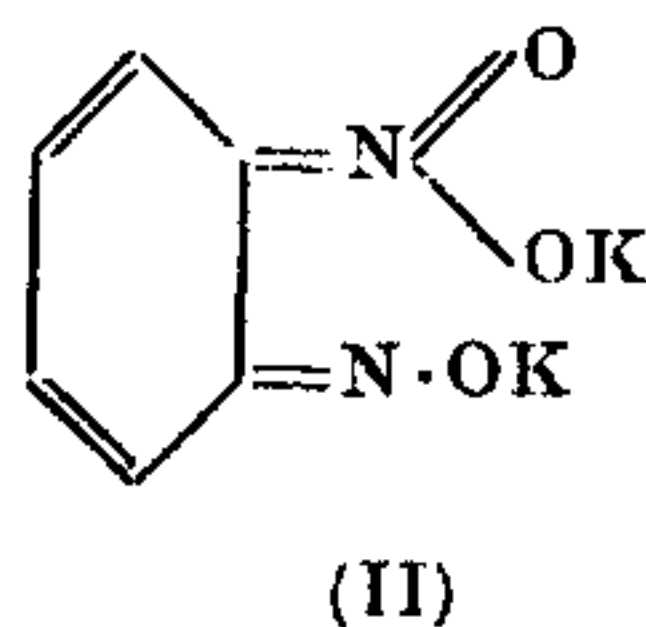
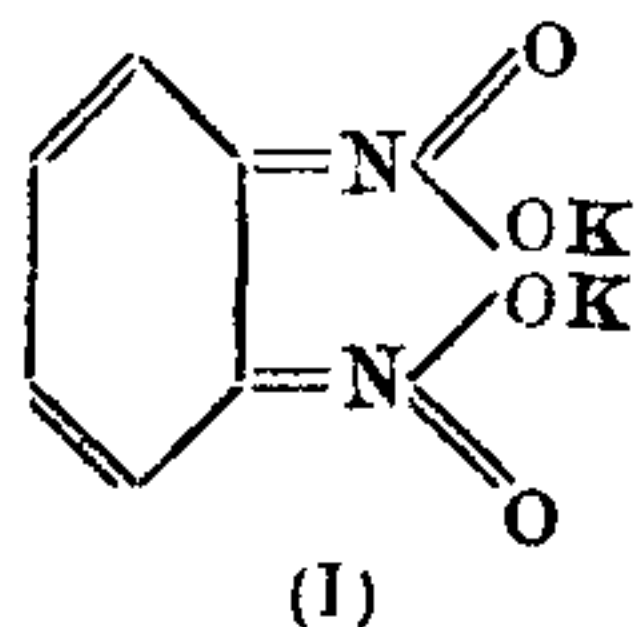
The paper as a whole is a most striking and important contribution, and the author's treatment of the general biological problems connected with this fauna is very clear and stimulating. In a country like India, where there are several estuarine regions, the paper should prove a boon to the general biologist, especially as it contains a big list of useful references. Col. Sewell deserves to be heartily congratulated on this magnificent piece of work.

Letters to the Editor.

Truhaut's Colour Reaction for Uric Acid.

QUITE recently Truhaut (*J. Pharm. Chim.*, 1933, **125**, 339) observed that many compounds having a $-\text{CO}-$ grouping in the molecule gave a colour reaction with *m*-dinitrobenzene in alkaline solution. Uric acid is stated to give a stable and characteristic violet colour, when to a warmed mixture of 1 c.c. of 1% *m*-dinitrobenzene (in alcohol) and 2 c.c. of 10% aqueous sodium hydroxide solution, 0.1 g. of uric acid is added. As a matter of fact, a specimen of "pure" *m*-dinitrobenzene (supplied by Dr. Fraenkel and Dr. Landau of Berlin) gave a positive reaction under the above conditions. No colour reaction was, however, observed after this sample had been repeatedly crystallised from absolute alcohol. *o*-Dinitrobenzene, on the other hand, produced a violet colour even in *very minute* quantities. It is therefore believed that the sample of *m*-dinitrobenzene used by Truhaut was not free from *o*-dinitrobenzene and hence the colour.

The violet colour may be due to the formation of a quinonoid salt (I) (Meisenheimer, *Ber.*, 1903, **36**, 4174), or (II). Prof.



W. Lipschitz (private communication) on the other hand prefers the structure (III).

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A Note on the Course of Crystallisation of a Basaltic Magma.

IN the study of the order of crystallisation of the different minerals in a cooling magma, according to Dr. Holmes¹ "the real order of formation is most likely to be ascertained from comparative observations on a series of rocks of similar chemical composition which have been quenched at different stages in their cooling history." A very good opportunity for such a study is afforded by an olivine dolerite dyke, occurring near Mysore. This dyke is about 65 feet in width and a good section is exposed in a channel cutting across the dyke. The dyke shows gradual textural changes from a porphyritic basalt at the selvages in contact with the gneissic country rock—to a coarse gabbro with sub-ophitic texture in the centre. The different stages of cooling history are thus clearly revealed, and from a microscopic examination of a series of graded sections from the margin to the centre, it is possible to study the order in which the minerals appeared and the order in which their crystallisation ceased.

¹ A. Holmes, *Petrographic Methods and Calculations*, 1930, pp. 350-351.