Fig. 3. Type 25 gram.

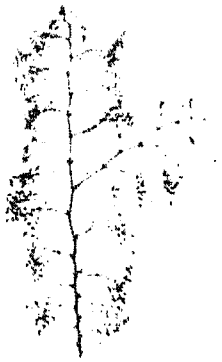


Fig. 4. Mutant in Type 25 gram.

Further investigations are in progress.

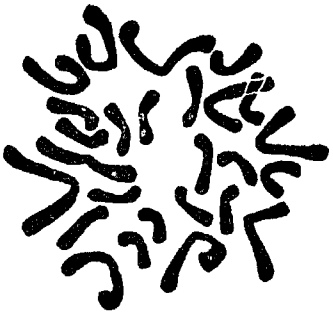
R. B. EKBOTE.

Imperial Agricultural Institute,
New Delhi,
May 19, 1937.

Chromosomes of *Rana tigrina*.

CONSIDERABLE advance has been made during recent years in our knowledge of the Amphibian chromosomes, and several species belonging to the genus *Rana* have been investigated in this direction. But so far as we are aware no report exists up to the date of writing as regards the chromosomes of the well-known Indian species, *Rana tigrina*.* A briet account of our preliminary observations on the chromosomes of this species is presented herewith.

A polar view of the equatorial plate in the metaphase clearly shows 26 chromosomes of different sizes and shapes having V- and J-shape. We have examined several plates showing this stage and in all of them invariably the number of chromosomes is 26 showing the above-mentioned variation in size and shape as shown in the accompanying Fig. 1. All the chromosomes seem to show median or sub-median fibre attachment, since they show constrictions either median or sub-terminal. In this respect, therefore, the Indian species resembles the Japanese forms, *R. nigromaculata* and *R. rugosa* investigated by Iriki[1] and the European form, *R. esculenta* studied by Galgano.[2] However, the Indian frog differs from *R. temporaria*, studied by Makino[3] in the fact that in the latter species there are constantly found two very small grain-like chromosomes, which are absent in the



1

2

Fig. 1. Spermatogonial metaphase showing 26 univalent chromosomes.

Fig. 2. Primary spermatocyte metaphase showing 13 bivalents. Camera lucida drawings, magnification being 4200 ×

chromosomal complex of *R. tigrina*, *R. nigromaculata* and *R. rugosa* and *R. esculenta*

In the primary spermatocytes 13 bivalents are seen at the metaphase (Fig. 2), five or six of which are of large size while the remaining are small. All the chromosomes appear thick and much condensed as is generally the case with the majority of Anurans so far studied.

J. J. ASANA.
R. G. KHARADI.

Gujarat College,
Ahmedabad,
May 26, 1937.

* See the list by Oguma and Makino, *J. Genet.*, 1932, **26**

[1] Iriki, Sh., *Science Reports of the Tokyo Bunrika Daigaku*, 1932, **B 1**, 61.

[2] Galgano Mario, *Monitore Zoologico Italiano* supp., 1931, **41**, 224.

[3] Makino, S., *The Proceedings of the Imperial Academy*, 1932, **8**, 1, 23.

Pearl-like Concretion from a Siluroid Fish.

WHILE investigating the fauna of the Calcutta Corporation Waterworks at Pulta in November 1936, the author had the occasion to collect a large number of dead or dying Siluroid fishes of the species, *Rita rita* (Hamilton) found floating in one of the *pucca* settling tanks which were buried after examination in a pit in the earth with a view to prepare the skeleton. After four months, *i.e.*, in March 1937 while the skeletal remains were being removed from the pit, the author observed a small, bright, salmon-coloured, transparent spherical mass attached to a piece of disintegrated tissue sticking to the skeleton of the dorsal fin. Closer examination showed this to be a pearl-like concretion (Fig. 1) not unlike those from marine fishes in general appearance and structure previously recorded by the author.[1] There were meridional cracks, both superficial and

deep, on the surface of the concretion revealing several concentric layers of apparently chitinous material which were strongly striated in a meridional direction. The

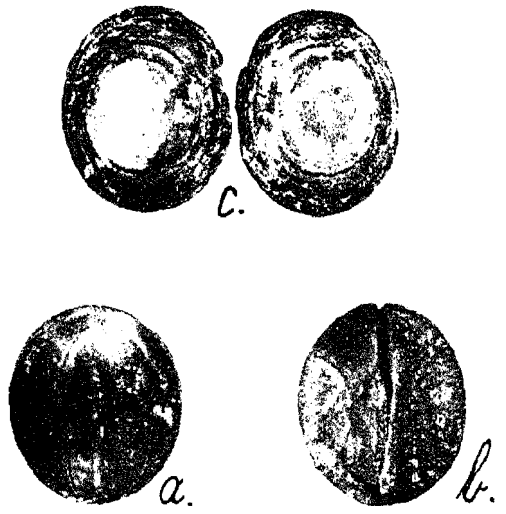


Fig. 1 × 7.

Pearl-like concretion from a Siluroid Fish.

a—Before immersion in water. *b*—After immersion in water for three days. *c*—The inner surfaces of the concretion cut in a slightly excentric section passing through the nuclear part and showing the loose concentric layers composing the concretion.

concretion was 2·8 mm. in diameter, 0·0138 gm. in weight, and had a refractive index of 1·560. The specific gravity was 1·394 when dry and 1·604 after immersion in water for 3 days, showing that the concretion was capable of absorbing a considerable quantity of moisture. After 3 days in water, the concretion showed more longitudinal cracks and splitting of the layers, lost its transparency, and its colour which faded to a dull pale-brown (see Fig. *c*). Although a careful search was made in the pit (containing the skeleton of 18 fishes) for more pearl-like concretions none was found. The formation of such 'pearls' in fish is presumably very rare. The position in which the 'pearl' was found does not imply that there was an organic connection between it and the tissues underlying the dorsal fin, for under the conditions of putrefaction in the pit the 'pearl' may have been displaced from its original location in some other part of the body of the fish, and come to lie on the skeleton of the dorsal fin.

The occurrence of the skeletal remains of a marine Siluroid fish in *Caranx* (*Caranx*) *melampygus* Cuv. Val. from the Andamans (*vide* p. 97 of the reference cited) along with pearl-like concretions, and the present occurrence in freshwater Siluroids of similar 'pearls' seem to suggest that the phenomenon is probably peculiar to the Siluroids, but the present meagreness of knowledge on the subject does not warrant such a conclusion.

The author's thanks are due to his friend, Dr. M. S. Krishnan of the Geological Survey of India, for the determination of the specific gravity and refractive index of the 'pearl'.

H. Srinivasa Rao.
Zoological Survey of India,
Calcutta,
June 4, 1937.

[1] *Proc. Nat. Inst. Sci. India*, 1936, **2**, 93–100, pl. ii.

Influence of the Phenyl and Carboxyl Groups on the Course of Reaction in Walden Inversion Processes.

Contradictions in the empirical generalisations of Frankland[1] and Horton[2] and the inadequacy of the experimental data available to test the rules have already been pointed out.[3] With a view to understanding the influence of the carboxyl and phenyl groups in the course of reaction in Walden inversion processes, substitution reactions with monoethyl-*l*-malate (I), *l*-α-hydroxy-glutaric acid (II), *l*-α-hydroxy-*iso*valeric acid (III), and *l*-α-hydroxy-*iso*caproic acid (IV) have been studied. Substance (I) gave monoethyl-*l*-chlorosuccinate by treatment with thionyl chloride while diethyl-*l*-malate is known to yield diethyl-*d*-chlorosuccinate lending direct evidence to the validity to Horton's rule. (II), (III) and (IV) are found to react with thionyl chloride and subsequently with hydroxylating agents (potassium hydroxide or silver oxide) just in accordance with the requirements of the above rule. The uniform behaviour of a halogenating agent and a hydroxylating agent when employed successively, as observed in the above experiments, also lends support to Horton's generalisation.

The author wishes to express his thanks to Dr. P. C. Guha for his keen interest in the above investigation.

V. Anna Rao.
Department of Organic Chemistry,
Indian Institute of Science,
Bangalore,
June 21, 1937.

[1] Frankland and Garner, *J.C.S.*, 1914, **105**, 1101.
[2] C. L. Horton, *Chem. News*, 1913, **108**, 37.
[3] Anna Rao and Guha, *J. pr. Chem.*, N.F., 1933, **138**, 167.