"Supplement to descriptive Catalogue of the Fishes of Australia." By the Hon. William Macleay, F.L.S. From the Author.

"Victorian Naturalist." Vol. I., No. 3., March, 1884. From the Field Naturalists' Club of Victoria.

A very large and valuable collection of the publications of Belgian Scientific Societies. From M. Th. Lefèvre, Secretary of the Royal Malacological Society of Belgium.

"Feuille des Jeunes Naturalistes." No. 161, March, 1884. From the Editor.

"Mémoires de la Société de Physique et d'Histoire Naturelle de Genève." Tomes XXIII. to XXVII. and XXVIII., Part I. 1873 to 1882, 4to. From the Society.

"Linnæi Genera Plantarum." 1 Vol., 8vo., 1764. From Thomas Whitelegge, Esq.

"Entomologisk Tidschrift pa foranstaltande af Entomologiska föreningen i Stockholm." Arg. 4, Heft. 1, 2, 3 and 4, 8vo, 1883. From the Society.

PAPERS READ.

ON THE PRESERVATION OF TENDER MARINE ANIMALS.

By R. Von Lendenpeld, Ph.D.

I shall endeavour here to give a few hints on this subject which may be of service to those of our members, who have no access to the Zoological Journals in which such methods of preserving are described. I do this in consequence of a wish expressed at the March meeting at the Linnean Society of N.S.W.

Medusæ, Actiniæ, Alcyonidæ, and particularly also Syphonophora and Cnetophora are so tender, and contain in parts of their bodies such a great percentage of water (in Aurelia as much as 97%!) that it is difficult to preserve them without their shrinking.

Like other specimens, these also should be kept in strong *non-methylated* spirits of wine (70-80%), or in a mixture of alcohol and glycerine. But if they were placed in such a liquid immediately on being caught, they would shrink to a shapeless mass and be useless. It is therefore necessary to harden them before placing them there. This hardening can be effected by the aid of compounds of heavy metals which act chemically on the Protoplasm in the cells, and harden it, thereby hardening the whole specimen. The metal itself, or its Oxide, is frequently precipitated in the Protoplasm, causing the whole to turn a dark colour.

Osmic Acid, Chromic Acid, Chloride of Gold, Chloride of Palladium, Chloride of Quicksilver, Nitrate of Silver, and Chloride of Iron, are used for the above-mentioned purposes.

The solutions in use are very weak, from 0·2 to 1% in strength, and the animal is immersed in them directly after having been removed from the seawater. The different solutions are allowed to act for some time, from one second to an hour or more as the case may be. Then the specimen is well washed in fresh water and placed in *weak* spirits (30 or 40%.) It is left there a short time, then placed in stronger spirits, and finally put into the strong spirits, (70-80%.)

Different solutions are used to gain different ends. Osmic Acid preserves the Epithelia wonderfully, whilst Chloride of Gold and Picric Acid have a greater effect on that sort of Protoplasm which is met in Ganglia cells and Nerves, wherefore these are often used for the purpose of studying the latter. Chloride of Mercury (corrosive sublimate) is very much used and greatly recommended by many. Chromic Acid or Bichromate of Potassium, make the Protoplasm yellow, and coagulate it in such a manner as to make it perfectly intransparent. Very transparent animals can, therefore, be made better visible by Chromic Acid. It must be used in very weak solution, and particularly carefully washed out before the specimens are placed in spirits. It preserves Epithelia exceedingly well, and is very useful to put fish in before preserving them in spirits.

Silver is reduced principally in the intercellular substance, and therefore used to demonstrate the cell margins. Chloride of Palladium is used for the same purposes as Gold.

Besides preserving the animals in a natural state, it is also necessary to preserve them in an expanded state, and as all animals naturally roll themselves up and retract their soft appendages when placed in a poisonous solution, it is attended with great difficulty to kill them so rapidly that they have not time to retract.

Sometimes it is possible to kill Hydroids and the Zooids of Corals with Osmic Acid so rapidly that they do not contract. Much more difficult this is with the Actiniæ (Sea anemones). The best way to preserve these latter in an expanded state, is to warm them to a temperature of about 43° C. Hereby they do not contract, and are lamed partially by the high temperature.

They can then be chloroformed, the only poison which has any effect on them (1), and treated with Osmic Acid, or any of the other re-agents.

The Osmic Acid is a high Oxide 0_3 0_5 of the Metal Osmium belonging to the Platina group with a specific weight of 22. It is exceedingly rare, and derived only from the remains of material out of which Platina has been obtained.

F. E. Schulze was the first to introduce this substance into the Zoological Laboratories. And more discoveries are due to the application of this re-agent, than to any other.

---

(1) The brothers Hertwig have shown that Curare and Cyanite of Potassium, and also Morphine do not affect them. A bit of Cyanite of Potassium half as big as a sea anemone placed in its stomach, does not kill it.