*Family Bacteriaceae. Cylindrical forms, ciliated.*

(1) Genus Bacillus. Forms with peritrich cilia.
(2) Genus Pseudomonas. Forms with polar cilia.

It cannot but be interesting to medical bacteriologists to learn that the pathogenic Streptococci are motile. At the conclusion of the third paper the exact method by which successful cilia preparations can be obtained is given.

## *FLUORESCENT BODIES EXCITED BY RADIUM.*

SINCE very active preparations of radium have become available, a steady search has been going on in many quarters for agents which will respond to the radiations and convert them into visible light. The most powerful fluorescer towards the $\alpha$ radiations is Sidot's hexagonal blende, a crystallised form of zinc sulphide, which is especially suited for use with the emanation. The most powerful to the $\beta$ radiation is willemite, a zinc silicate, which gives a magnificent green fluorescence, and is probably quite free from any phosphorescence after the action of the rays ceases. This if left in the radium emanation steadily increases in brightness as the excited activity, and with it the $\beta$ radiation, is produced, and reaches its maximum some hours after the emanation has been introduced. The same is true of kunzite, a new variety of spodumene discovered by Dr. Kunz, and supplied by Messrs. Griffin and Sons, Ltd. The colour of the light might be variously described by different observers as salmon-pink, warm orange, or orange-yellow, according to individual opinion. Kunzite is a transparent gem-like crystal, and is one of the most beautiful examples of the fluorescent bodies at present available for demonstrating the luminous effects produced by the radium rays. It is, however, not very powerful compared with willemite or the platinocyanides. Being, like the diamond, transparent, it shines especially well when exposed in a tube to the action of the concentrated radium emanation, as the whole mass of the crystal contributes to the light effect. The growth of the luminosity after the emanation is introduced, owing to gradual production of the excited activity, is more marked than in the case of willemite, as kunzite hardly seems to respond at all to the $\alpha$ radiation. This experiment would be instructive as a lecture illustration to prove that the emanation only gives $\alpha$ rays, and that the $\beta$ rays are produced only when time has been allowed for some of the emanation to change into the matter causing the excited activity.

The most brilliant and exquisite of all fluorescers for demonstration on a large scale are the platinocyanides in the form of large crystals. Those containing lithium give a beautiful pink, not unlike that of kunzite, but more brilliant. The colour of the latter is doubtless due to the lithium contained in it. The calcium and barium salts are characterised by a deep green, especially the former, whereas the sodium compound shines lemon-yellow. Magnesium platinocyanide, which is so beautiful under the X-rays, hardly responds at all to radium. The feeble $\gamma$ rays are best shown by a large crystal of the barium or lithium salt. Large crystals of the platinocyanides seem extremely difficult to obtain, and any manufacturer who could produce them would probably find a ready market.

A new fluorescent mineral, which, like kunzite, seems to respond only to the $\beta$ rays of radium, has been recently discovered by Mr. Armbrecht, a member of the firm of Armbrecht, Nelson and Co., chemists, Duke Street, W. The mineral is sparteite, a form of calcite containing a few per cent. of manganese. It occurs associated with willemite and with zincite, the red oxide of zinc, which contains a trace of manganese. It is pure white in colour, and under the action of the $\beta$ radium rays fluoresces a very deep orange. The light is not at all powerful, but the colour is very remarkable, and would excite comment merely as a fluorescent phenomenon without reference to the way in which it is produced. One authority described it as exactly similar to the colour given by neon in a spectrum tube. It is rather remarkable that the colour seems to depend on the intensity of the rays, and is of a deeper *tint* when the radium is held near than when it is removed a short distance. The same gentleman has discovered among the fluorites some examples of phosphorescence after exposure to radium which persist for several days, and exhibit marked increase of brilliancy on exposure to the warmth of the hand. He finds that kunzite exhibits a similar behaviour, the after phosphorescence (or thermo-luminescence?) being notably increased if the mineral is held in the hand.

The action of kunzite and sparteite under the kathode rays is of interest. In each case the colour is considerably different from that under the action of radium, being much yellower. Sparteite under these conditions is disappointing, but kunzite is a most beautiful sight. Its colour is a pure deep yellow without a trace of the warmth it exhibits under radium.

F. S.

## *THE PALOLO WORM OF SAMOA.*

THE periodical autumnal swarming in the seas around the Samoan Islands of the annelid locally known as the palolo has attracted the attention of residents in those islands and naturalists generally for many years. The swarming takes place in October and November, apparently on the day before the last quarter of the moon, and on this and the following day the sea is absolutely alive with the worms, of which the numbers seem to be greater in the November than in the October swarm. Early dawn is the time for the swarming to commence, and by sunrise the phenomenon is at its height. Not the least curious feature about the swarming is the fact that all the worms are imperfect and headless, and the nature of the complete worm has long been a puzzle to naturalists. Thanks, however, to the investigations of Messrs. Krämer and Friedländer, supplemented by the observations of Mr. W. McM. Woodworth, the solution of the problem has at length been discovered. The results of these investigations have been published in Dr. Krämer's "Die Samoa Inseln" (Stuttgart, 1903), while the original English version of this account, drawn up by Mr. Woodworth, appears in the *American Naturalist* for December last.

Palolo also occur in Fiji and elsewhere. The complete annelid—*Eunice viridis*—burrows into the reef-rock of Samoa, the reef, when prised open with a crowbar, proving shortly before the swarming season to be absolutely alive with palolo. Curiously enough, the Samoan natives, although familiar with the palolo when swarming, are quite unacquainted with it during the period of its rock-boring existence. Owing to the great length of the entire worm, its fragile structure, and its intricate association with the honeycombed reef, the extraction of complete specimens is a matter of considerable difficulty, demanding very delicate manipulation on the part of the operator.

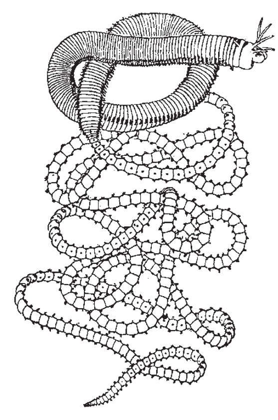

FIG. 1.—*Eunice viridis* (Gray). The narrow posterior epitokal part when detached and free-swimming is known as the "Palolo."

The complete annelid consists of two distinct parts, a broad anterior "atokal" portion, sharply marked off from a slender and much longer "epitokal" portion, which at the swarming season becomes detached and constitutes the free-swimming palolo. The total length averages 40 centimetres, of which about the first fourth is formed by the thick atokal portion. From 250 to 430 is the approximate number of segments in the atokal region, the smaller number occurring in a female and the larger in a male. In the males the colour is reddish brown, and in the females bluish green. These sexual colours are most strongly marked in the epitokal region, where they are due to the sperm and ova, the collapsed integument being quite colourless after the discharge of those elements.

Palolo, as above mentioned, are by no means confined to Samoa. "A similar swarming of marine annelids," writes