

nearest congeners, at present existing. It is also incorrect to assert that only in man, a few American monkeys, and the anthropoid apes, does the hair slope towards the elbow. This Human Type is seen in the corresponding area of this segment of the anterior extremity of almost all hairy mammals, excepting most of the Ungulate types, and those with woolly hair. It is found very constantly in Carnivores, especially those which frequently rest in a "couchant" attitude, in which the head is held erect, the fore-limbs planted in front of the body, and the extensor surface of this limb-segment resting flat on the ground, also in certain other positions of rest; and it can be seen in nearly all wild Carnivores and domestic cats and dogs. In those Carnivores which assume this attitude the posterior limbs adopt a much more variable "pose," and here there is no constant form of hair-slope. The backward curl of hair on this narrow area of the fore-arm in man, certain monkeys, and many other hairy mammals, seems to be due to a mechanical force, slowly acting downwards and forwards, which makes for this direction of hair-slope. In all these three classes it is obvious that such pressure is frequent. This explanation of an inherited character, maintained by a simple physical cause, meets the case far better, I submit, than any supposed tracing out of ancestral vestiges.

WALTER KIDD.

IS ANIMAL LIFE POSSIBLE IN THE ABSENCE OF BACTERIA?

SOME ten years ago Pasteur, in one of those "causeries du laboratoire" which those who were privileged to take part in will never forget, discussed with the young scientific men around him the interest which would attach to the nourishment of an animal from its earliest existence with sterilised food under conditions which would ensure the absence of all microbial life. "Sans vouloir rien affirmer," he added, "je ne cache pas que j'entreprendrais cette étude, si j'en avais le temps, avec la pensée préconçue que la vie dans ses conditions deviendrait impossible. . . . Que le résultat soit positif et confirme la vue préconçue que je mets en avant ou qu'il soit négatif et même en sens inverse, c'est-à-dire que la vie soit plus facile et plus active, il y aurait un grand intérêt à tenter l'expérience."

To decide this question Messrs. George Nuttall and H. Thierfelder have carried out elaborate experiments in the Hygienic Institute of the Berlin University with young guinea-pigs removed from the mother by means of the Cæsarean operation. Every conceivable precaution was taken to prevent all access of bacterial life. The young guinea-pig was placed in a sterilised chamber, supplied with sterilised air, and it was fed exclusively upon sterilised milk. It had to be supplied with food every hour, day and night, a process which so exhausted the investigators that at the end of eight days, when it had consumed 330 cubic centimetres of milk, and to all appearances was in perfect health and spirits, it was killed.

A microscopic examination of the contents of the alimentary canal revealed no bacteria whatever; aerobic and anaerobic cultures in various media were further made of the intestinal contents and of the excreta, but in every case the culture tubes remained sterile, not a single colony made its appearance. Messrs. Nuttall and Thierfelder claim by these experiments to have proved conclusively that the presence of bacteria in the alimentary canal is not essential to vital processes, at any rate in the case of guinea-pigs; and they consider themselves justified in assuming that other animals, and also human beings, could similarly exist in the absence of bacterial life, as long as the food supplied is purely animal in character. Whether the conditions would be altered by the addition of *vegetable* food to the diet, they next endeavoured to determine. In this series of experiments the food selected was so-called "English" biscuits containing about 7 per cent. nitrogenous material, 9 per cent. fat, 17 per cent. sugar, 58 per cent. of other non-nitrogenous matters, and 0.2 per cent. cellulose; these, together with the milk employed, were sterilised before use. The same rigorous precautions characterised these experiments as the previous ones; more animals were, however, secured, and they were allowed to live longer. The weight of the animals was this time carefully noted, and during the ten days, during which the experiment lasted, one animal gained 23 grammes and another 11 grammes. This calculation could only be an approximate one, as the experimental animals were not weighed when originally removed from the mother, and their initial weight was

only arrived at by weighing the other guinea-pigs which were removed at the same time, but not experimented upon. Thus in the case of vegetable substances bacterial life is apparently also not essential for carrying on digestive processes. The authors made also as careful an examination as was possible with the limited amount of material at their disposal, of the urine, and state that aromatic oxyacids were undoubtedly present. This result they regard as confirmatory of E. Baumann's assertion that aromatic oxyacids may be elaborated independently of intestinal decomposition. To this point they intend, however, to return later; at present further investigations are in progress with fowls, and the results will be awaited with the greatest interest, while immense credit is due to the authors for the ingenuity of the methods they have devised, and the self-sacrificing laboriousness with which they have conducted the experiments.

SOCIETIES AND ACADEMIES.

EDINBURGH.

Royal Society, Dec. 21, 1896.—Lord Kelvin in the chair.—The first paper, on atomic configurations in molecules of gases according to Boscovich, was by the President himself. At the outset Lord Kelvin confessed that the problem was quite beyond him, and he only desired to throw out some suggestions. Boscovich's theory would quite well explain the atomic configuration of a gas if we could only apply it. In a monatomic gas the problem was fairly easy, collision between molecules leading to change in direction, either backwards on the original path, or at an angle, according as the impact was direct or oblique. For a diatomic gas we must imagine a "pair of somethings" held together by a mutual force which knocked about like one. He thought he could see why a diatomic gas should become monatomic when its temperature was sufficiently raised. But he could not yet understand why, when the process was reversed, molecules should combine in quartettes rather than in pairs, or triplets, and he illustrated his conjectures by means of models. He showed by means of these how, for example, the mutual repulsion between the H's might prevent O from combining with any more than two, and hence we did not have H₂O. And he explained, similarly, how O₂ was unstable, as the octohedral arrangement of the atoms (taking O = O₂) was easily broken up. But the whole subject was one of tremendous difficulty.—In an abstract from a paper on the caecal fossæ, Dr. Richard Berry pointed out that the pericæcal folds and the resulting fossæ were primary in origin, and vascular in evolution. He strongly dissented from Treves' view that the meso-appendix is a substituted mesentery, maintaining that the ilio-colic and ilio-caecal folds were the true caecal mesenteries, primary and subsidiary respectively, the meso-appendix being the true appendicular mesentery. Arguing from this and other facts which he adduced, Dr. Berry stated that it would almost appear as though the appendix were gradually replacing the cæcum in functional activity. Passing on to the retro-caecal fossæ, he pointed out the inaccuracy of the term retro-caecal as applied to these fossæ, suggesting for them the name retro-colic as being more accurate and more scientific. He proceeded to show that these fossæ were secondary in origin and depended for that origin upon the secondary coalescence, sometimes wanting, of the colon, cæcum, and mesentery, to the posterior abdominal wall. In this respect Dr. Berry differed from almost every British author. He pointed out the variability of these fossæ in number and position, and strongly emphasised their importance to the surgeon in view of the prevalence of appendicitis and the part which these fossæ, according to the author, play in the etiology of that disease.—Dr. T. H. Milroy read a paper dealing with research into the nature of the nucleins and paranucleins of the animal cell. During the last few years much attention has been paid to two great classes of proteids intimately connected with the life of the cell, viz. the nucleins and paranucleins. The former class has been rather vaguely defined as including proteids which have only two points in common—a high percentage of phosphorus in organic combination, and a marked resistance to the action of the gastric secretion. The natural nucleins examined were those of the thymus gland of calves, of the red blood-corpuscles of birds, and of the pancreas of the ox; and these were found to agree in almost every particular with artificial syntonin-nuclein. That is, they were only slowly dissolved, not decomposed by the gastric juice (with the exception of the pancreas nuclein), while trypsin and sodium