

into air have been determined. The following examples have been taken from Landolt and Bernstein's tables :—

| Gas or Vapour. | Coefficient of Diffusion into Air. | Molecular Weight. |
|--------------------------|------------------------------------|-------------------|
| Water vapour | 0.198 | 18 |
| Carbonic acid gas | 0.142 | 44 |
| Alcohol | 0.101 | 46 |
| Ether | 0.077 | 74 |

In the above we see that the coefficients of diffusion follow the inverse order of the molecular weights. In cases of the simpler gases it has been shown experimentally that the coefficient of inter-diffusion is approximately inversely proportional to the square roots of the product of the molecular weights. If we apply these considerations to the emanations we see that it is a gas or a vapour of molecular weight (allowing a wide margin) probably lying between 40 and 100. These numbers exclude the possibility of the substance being a vapour of radium, for it has already been shown by M. and Mme. Curie that the atomic weight of radium is greater than that of barium.

We must, therefore, conclude that the emanation is in reality a heavy radio-active vapour or gas.

On account of the rapid decay of the radiating power of thorium emanations it is not possible to determine its coefficients of diffusion in the same way; but special experiments show that it diffuses rapidly, and is also probably gaseous in character. The physical properties of these emanations or gases are most remarkable. The radium emanation not only continues for long intervals to be a source of radiation which is apparently similar in character to easily absorbed Röntgen rays, but in some way manufactures from itself a positively charged substance, which travels to the negative electrode and becomes a source of secondary radio-activity.

Space is too short to enter into the interesting question of the possible explanation of these complicated phenomena.

McGill University, Montreal, May 30. E. RUTHERFORD.

Long-tailed Japanese Fowls.

A LITTLE while ago in your columns Prof. Lankester referred to this breed as "a magnificent sport," and considered the occurrence of genius in mankind as a case of the same kind. In Newton's "Dictionary of Birds," article "Feather," it is stated that in these Japanese poultry the moult is checked or prevented by some means unknown to Europeans. It is obvious that the latter statement, if correct, is not compatible with Prof. Lankester's description. If the breed really arose as "a magnificent sport," I presume that the excessive growth of the tail coverts would be due to a spontaneous variation, and not to some artificial method of preventing the annual moult. After a great deal of trouble I have succeeded in obtaining evidence, which seems to me unimpeachable, concerning the means taken by the Japanese to produce this extraordinary elongation of feather in the cocks of the breed in question.

I will quote the words of my informant. He writes :—"With regard to the treatment of these birds, in order to ensure very great length of tail, they ought after they are six months old to be kept on a perch as much as possible, and the tail feathers should be pulled gently every morning, grasping the centre bone-like part firmly with the finger and thumb, and, pressing steadily, draw downwards towards the tip, each feather being done several times; this softens the quill and causes it to lengthen. They do not moult the feathers, but if one or more come out others immediately grow in their place. The Japs themselves, those who take great pride in their birds, always roll the long feathers up, like a lady rolls up her hair, and tie them, whenever they are let off their perches to walk about, which is about twice a day for an hour at a time. . . .

"I have often seen them thus treated in Japan, and the man who brought mine over treated them in this way on the voyage over, and I sent them (to purchasers) in their regular perch cages."

I think this, being the evidence of direct observation, is enough to prove that the length of feather in these birds is not correctly described as a "sport," but has been produced by special artificial treatment. The effect of the treatment is doubtless to irritate the papilla from which the feather grows, and so cause increased growth, rather than to soften and lengthen the already formed quill. The feathers appear to grow throughout the year, so that when the moulting season is reached they are not shed, but continue growing.

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There is no doubt that the peculiarity is to a certain extent hereditary, but extreme length of feather cannot, I believe, be produced without the special treatment. These fowls have been bred in England, and I have seen specimens which had tail coverts (and also hackles) longer than those of any European breed, but so far as I know no specimens bred in Europe have produced the extraordinary length of feather that is known to occur in Japanese specimens, for example in the two stuffed specimens in the hall of the Natural History Museum. It seems to me reasonable to conclude that the hereditary effect is due to the artificial irritation applied to a long succession of generations. Penzance, June 5. J. T. CUNNINGHAM.

Variation in a Bee.

ON September 24, some years ago, I collected at Mesilla, New Mexico, four examples of a wild bee of the genus *Epeolus*, the species being probably identical with *Epeolus bardus* of Cresson. In every one of these specimens the second transverso-cubital nervure is incomplete, its lower half being wanting, on one or both sides. In one example only is the nervure incomplete on both sides; in the other three it is incomplete on the right side only. Such aberrations are not very uncommon among bees, but they usually occur in single examples, and this is the best instance known to me of their being inherited by a number of individuals. What is here clearly a sport seems in a fair way to become a racial character, and we seem to have a good example of Bateson's "discontinuous variation." In the genus *Ialictus* certain species have only two submarginal cells, instead of the usual three, and the same is true of *Andrena*. These peculiar species are related to different groups of the genera to which they belong, so that if it is proposed to regard them as pertaining to distinct subgenera (or genera) by reason of their venation, it becomes necessary to propose several sub-generic names instead of one, because of the independent evolution of the species. That this evolution has resulted from the perpetuation of sports such as that described above we can hardly doubt, but we are not thereby compelled to admit that it may not also be beneficial to the species.

T. D. A. COCKERELL.

East Las Vegas, New Mexico, U.S.A., May 25.

Foreign Oysters Acquiring Characters of Natives.

THE facts contained in Mr. Tabor's letter, however interesting, supply no evidence for or against Lamarckism. When at Whitstable, the individual French oyster has certain characters impressed upon it by its environment. The next generation, when compared with the natives, show certain peculiarities, such as greater thickness of shell and greater growing power. But this also we are able to interpret as the response of the individual to the environment. If the peculiarities appear in many successive generations, the same explanation will account for the facts. If, however, Lamarckians could show that the effect of the environment, as the generations succeed one another, is cumulative, that the characters in question become progressively accentuated, then they would prove their case. But it does not appear that they have any such evidence at their command. F. W. HEADLEY.

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ITALIAN EXPLORATION IN ARCTIC REGIONS.

THE recent success of the Duke of the Abruzzi's expedition, which carried the Italian flag nearer the North Pole than ever flag flew before, has doubtless prepared a public in Italy for the literature of Polar exploration. The firm of Hoepli, who have conferred many favours on Italian-speaking geographers, have just published a history of Polar exploration in the nineteenth century by Signor Hugues.¹ The book makes no claim to originality, being merely a condensed popular description of the Polar voyages of the late century, and although more detailed on account of the shorter range of time dealt with, and coming down to the year 1900, it cannot compare with General Greely's compact handbook as a work of reference for the student. The most serious drawback is the want of a bibliography or a uniform

¹ "Luigi Hugues—Le Esplorazioni Polari nel Secolo XIX." Pp. xx + 374. Maps and Illustrations. (Milano: Ulrici Hoepli, 1901.) Price 12 lire.