

Calanus. This would give about 6000 Copepods in the stomach of an average mackerel, or in a five minutes' haul of the tow-net, on this occasion.

It may be added that these mackerel were evidently not being nourished in accordance with the views of Pütter, and were clearly able to fill their stomachs from the plankton around them.

W. A. HERDMAN.

S.y. Runa, Tobermory, N.B., July 12.

Helium and Neon.

THE experiments communicated to the Chemical Society recently by Prof. Collé and Mr. Patterson, the lectures delivered by Sir J. J. Thomson, and the discussions which have taken place in NATURE, on the possible synthesis of the chemical elements have aroused great interest outside England. So far as I can ascertain, opinion is much divided. For my own part I may perhaps be permitted to say that I have always entertained the idea of a possible formation of elements of the helium group from other gases by *integration*, just as these are formed from other elements by *disintegration* (see *Chemical News*, 1896, and *Berichte*, 1899). When I put forward this view objection was taken that $4H$ is greater than He , 4.032 instead of 3.99, and the same kind of objection may be raised to-day that $He+O$, or $3.9+16$, is less than Ne , 20.2 (unless Ne is a mixture of gases).

In order that the above question might be solved definitely, I would beg to suggest that experiments should be conducted in Röntgen-tubes from the electrodes of which every trace of the gases "occluded" or firmly held by them would be first removed by continued bombardment with kathode rays.

As regards the question put forward by Sir J. J. Thomson, whether the new gas X_3 , discovered by him, may be a new element that fills the vacant space in VII. group, 1 series (VII-1), in Mendeléeff's periodic system, I may be allowed to remark that Mendeléeff's prediction of the properties of the elements Sc , Ga , Ge , could be successful, because it was an *interpolation*; whereas the prediction of the properties of the element $X=3$ includes an *extrapolation*, which is always rather uncertain; besides, the gases of the helium group were unknown at the time of the prediction. Its properties may be derived from the following equations:—(1) $Ne : F = He : X$; (2) $Li : F = H : X$; (3) $Li : H = F : X$; but also (4) $Fe : He = Mn : X$, and (5) $Cu : H = Br : X$, showing how uncertain the prediction of its properties becomes, so that it is indeed probable that it will be more negative than fluorine, but not necessary that the gas should combine with the silicon of the glass.

The delicacy of Sir J. J. Thomson's new method has superseded our old methods of investigation in a way similar to that based upon radio-activity, and the results of the study of the new gases discovered by this new method are awaited by chemists with the greatest interest.

BOHUSLAV BRAUNER.

Bohemian University, Prague, July 6.

Red Water and Brine Shrimps.

By the kindness of Mr. A. W. Sheppard and Prof. A. Dendy, F.R.S., I have been enabled to examine specimens of the brine shrimps from Geelong mentioned by Mr. Whitteron in his letter (NATURE, June 12, p. 372). They belong to the species *Parartemia zietziana*, described by the late Mr. O. A. Sayce in 1903 (Proc. Roy. Soc. Victoria, xv., part ii., p. 232). In *Parartemia* the unpaired uterine sac is produced into two large dorso-lateral lobes lying on either side of the "tail," and appearing, as Mr. Whitteron says, "like the egg sacs of Cyclops." Mr. Sayce's speci-

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mens were obtained from a "brackish-water swamp near Lake Alexandrina, South Australia." It is interesting to learn that the species is able also to live in the brine of salt-pans.

The flagellate described by Mr. Whitteron is probably allied to, and perhaps identical with, *Dunaliella salina*, which has long been known to cause a red coloration in the brine of salt-pans in Europe and Algeria. A detailed account of this form and references to the somewhat extensive earlier literature of the subject are given by Clara Hamburger ("Zur Kenntnis der *Dunaliella salina*," *Arch. Protistenk.*, vi., 1905, p. 111).

W. T. CALMAN.

British Museum (Natural History),

Cromwell Road, London, S.W., July 12.

The Maximum Density of Water.

PHYSIOGRAPHERS lead us to believe that the earth is defended from a profound glaciation, cumulative from year to year, by the law that water is heaviest at a temperature of four degrees above centigrade zero. If the main cause lies here, it is desirable that this measure should have its peculiar power set forth with more precision than has been customary.

The matter usually presents itself to students rather differently. The predominant fact is the floating power of ice. Hereby the water is screened from further attacks of the cold air, and dispersal is provided in the puzzling conditions of ground or anchor ice. Next perhaps in importance is the slow conduction of cold by water. Then comes the large value of the latent heat of water. It is not obvious why there should be disastrous results if the maximum density of water were at $0^{\circ}C$. The four units may be viewed as a helpful margin of safety rather than as an essential; but they would appear to be negligible in comparison with the 79 units of latent heat. Water at $0^{\circ}C$. is by no means unstable; each gram weight as it passes into ice throws out amongst its neighbours an amount of heat which is an effective safeguard against sudden and extensive solidifying.

W. B. CROFT.

The College, Winchester, July 5.

Radio-activity and the Age of the Earth.

I AM gratified to learn from Dr. Fermor's letter in NATURE for July 10 that there is a scientific possibility of conceiving how the interior of the earth may be devoid of radio-activity. But if "high pressure and temperature" can inhibit the dissociation of "potentially radio-active" substances, will they not do so also in the interior of the stars? If so, radio-activity will no longer be available to prolong their radiation of energy, and we shall be back in the old difficulty about the age of the sun. Indeed, it will be aggravated, because we now have positive evidence for a high antiquity of the earth, while still unable to explain that of the sun.

F. C. S. SCHILLER.

Corpus Christi College, Oxford, July 11.

THE GENERAL MAGNETIC FIELD OF THE SUN.¹

THOSE who are familiar with Prof. Hale's brilliant discovery of magnetic fields in sunspots, and are aware of the difficulties connected with that investigation, will greatly admire his courage in seeking to establish the much weaker general magnetic field of the sun itself. The following condensed account of the method adopted and results obtained is given, to some

¹ Based upon an advance proof of a paper by Prof. G. E. Hale which is to appear in *The Astrophysical Journal*.