condition has been evolved from the eleutherorhabdic condition, since in this species both ciliated discs and organic interfilamentar junctions are present.

Anomia aculeata is of no less interest, since it differs from the other species of *Anomia* examined, and resembles the rare *Dimya*, in that the gill filaments are not reflected, *i.e.*, they have no ascending portions.

A very careful examination was made of the gills of *Vesicomya* and *Euciroa*, which were said by Dall to exhibit close resemblances with those of the Protobranchia. Both prove to be of the synaptorhabdic type, and their superficial resemblance to the Protobranch gill is due to an expansion of the interlamellar edge of the filaments, a feature which is by no means confined to these two genera.

Evidence is also adduced to show that the forms included by Pelseneer in his order Septibranchia are, at least so far as can be judged by their branchial organs, degenerate Molluscs of the *Lyonsiella* type, and the suppression of the Septibranchia as a distinct order is advocated.

"On some Phenomena which suggest a Short Period of Solar and Meteorological Changes." By Sir Norman Lockyer, K.C.B., F.R.S., and William J. S. Lockyer, M.A., Ph.D., F.R.A.S. Received June 14,—Read June 19, 1902.

In continuation of the inquiries referred to in a former paper on Indian rainfall and solar activity,* attention has more recently been devoted to an examination of the variations of pressure over the Indian and other areas.

1. It is well known that in India during the summer months (April to September) and during the winter months (October to March) low and high pressures respectively prevail. In the case of the latter, the pressure is found to exhibit very remarkable and definite variations, and is in excess, every $3\frac{1}{2}$ years, on the average, while at these times of excess of high pressure the low pressure during the other 6 months of the year is deficient; so that every $3\frac{1}{2}$ years or so the high pressure becomes higher and the low pressure is not so low as usual.

2. Further, this short-period variation, which appears in the mean variation of pressure over the whole of India, is as well defined in the mean values for individual stations, such as Bombay (fig. 1, Curve F), Calcutta, Madras, Nagpur, &c.

3. The view that the variation of pressure in question over India and its neighbourhood is not due to local causes, but is produced by some

* 'Roy. Soc. Proc.,' vol. 67, p. 409.

external or extra-terrestrial action, is considerably strengthened by an examination of the pressure-curve of a very distant station, such as Cordoba. Dealing with the pressure of Cordoba during the high-pressure

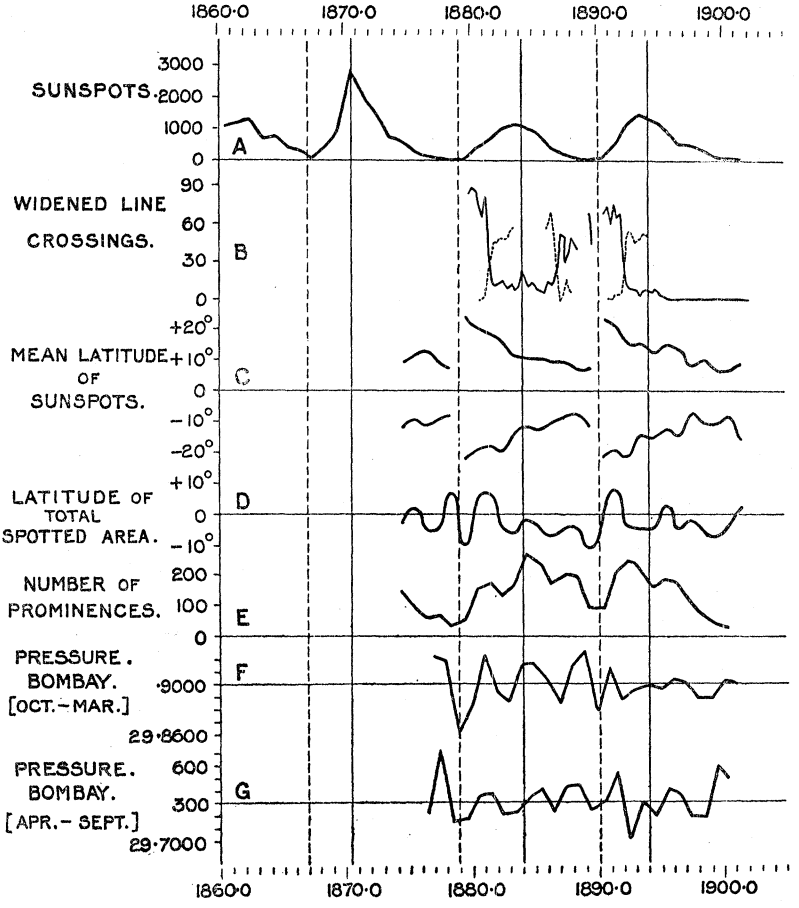

FIG. 1.

months, April to September, the curve (fig. 2, Curves F and E), representing the variation from the mean from year to year, is exactly the *inverse* of the curve representing the Bombay and other Indian pressures for the same months over the same period of time. The cause, therefore, which raises the mean value for the low-pressure months over the Indian area would appear to lower the mean value of high-pressure months at Cordoba simultaneously. In fact, we have a see-saw.

4. Further investigation shows that not only do the pressures of

practically the whole Indian area exhibit variations from year to year, which present very similar features, but that this is the case with other large areas. Thus, for instance, it is found that the yearly mean pressures for Brussels, Bremen, Oxford, Valencia, and Aberdeen (the only pressures that have been at present examined) are all remarkably similar in their variations from year to year, and it might almost be said that one curve, representing the variations from the normal, would approximately define the pressures at all these places.

The probable extra-terrestrial origin of these short-period variations led to a detailed examination of the records of the phenomena connected with solar spots and prominences, with a view of seeing whether similar variations, indicating changes in the solar activity, could be detected.

5. A preliminary reduction of the Italian observations of prominences observed on the sun's limb since 1871 was first undertaken. The result of this inquiry indicates that, in addition to the main epochs of maximum and minimum of prominences, which coincide in time with those of maximum and minimum of the total spotted area, there are prominent subsidiary maxima and minima having a similar short period and also coinciding in time. (Fig. 1, Curve E.)

6. Although these subsidiary prominence pulses are not distinctly duplicated in the curve representing the spotted area of the solar surface, it is to be noted that corresponding pulses are indicated in the curves which represent the change of latitude of spotted area from year to year; and in each case an increase in prominence activity is associated with a decrease of latitude of the spotted area. (Fig. 1, Curves C and D.)

7. A comparison of these solar data with those already referred to relating to terrestrial pressures suggests that these simultaneous outbursts of prominences and changes of the latitudes in which the spots occur about every $3\frac{1}{2}$ years are the true cause of the pressure changes; and that the varying intensitv of solar activity during the sunspot period of 11 years produces an effect on the pressure and circulation of our atmosphere, thus affecting the whole globe meteorologically.

8. The close correspondence between the epochs of these subsidiary pressure variations and those representing prominence frequency, suggests not only their very close relationship, but that the terrestrial pressure quickly answers to the solar changes, while so far as the work has gone it would appear that rainfall (fig. 2, Curves A, B, C, D) and snowfall are subsequent effects.

9. It may be remarked that we have already obtained evidence showing that this short-period variation is not the only one acting, but that the 11-year and 35-year periods apparently influence the short-period variations; but even this does not explain some anomalies already met with, and should the solar origin of these short-period

pressure changes be subsequently confirmed, some of them not constant in all localities will have to be explained; and it is possible we may obtain in this way some new knowledge on the atmospheric circulation.

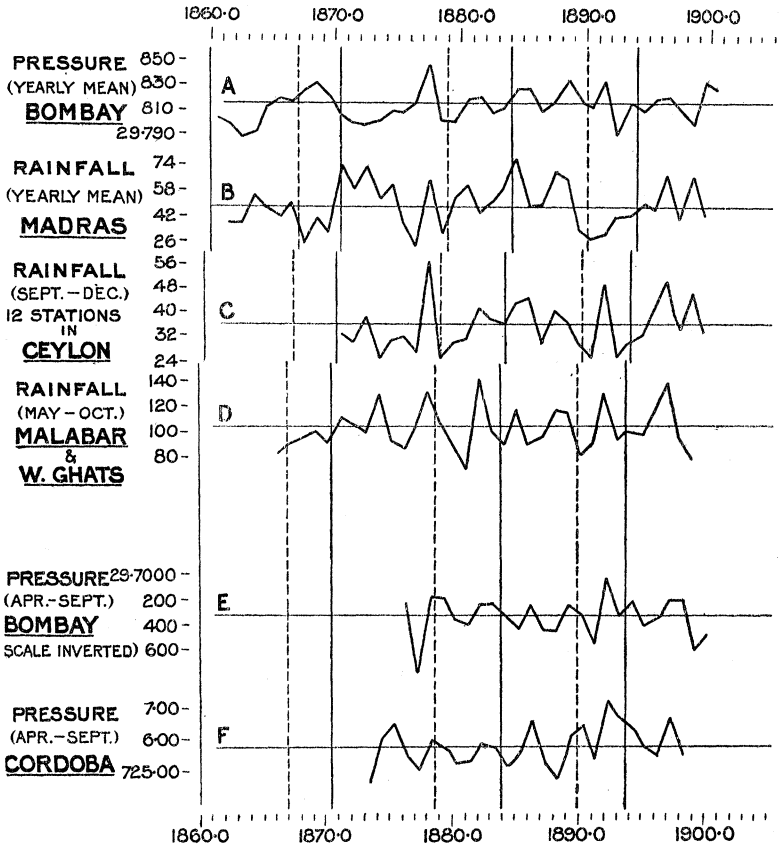

FIG. 2.

10. The period of time included in this survey begins generally with the establishment of the full records of the Indian Meteorological Department in 1875 and extends to 1895, when the regularity of the widened-line phenomena was broken, as stated in a previous communication.

ADDENDUM. Dated June 26.

In continuing the above researches we have plotted the percentage frequency of the solar prominences derived from the Italian observations for each 10° of solar latitude N. and S. of the Equator.

We find that the epochs of maximum prominence disturbance in the higher latitudes are widely different from those near the Equator. The latter are closely associated with the epochs of maximum spotted area; the former occur both N. and S. at intervening times.

We have then two sets of strongly marked prominence outbursts occurring at intervals of between 3 and 4 years.

Both sets are represented closely in the Indian pressure curves.

"On Two Methods for the Limitation and Regulation of Chloroform when administered as an Anæsthetic." By A. VERNON HARCOURT, F.R.S., Reader in Chemistry at Christ Church, Oxford. Received June 17,—Read June 19, 1902.

In the 'Transactions of the Chemical Society' for 1899 an apparatus is described for providing a current of air mixed in any desired proportion with chloroform vapour. This apparatus served its purpose in experiments on small animals, but was on too small a scale, and offered too much resistance, to provide the free supply of air at a rate of 4 or 5 litres a minute which human respiration requires.

A gas passing close over the surface of a liquid for a sufficient distance yields to the liquid any part of the gas which is soluble, and takes up from the liquid any part of the liquid which is volatile, as completely as when the gas bubbles through the liquid, while suffering much less resistance to its passage.

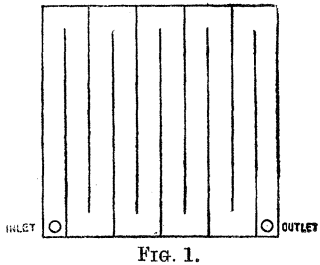

FIG. 1.

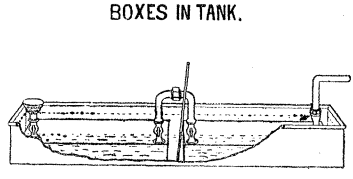

FIG. 2

The apparatus shown here (figs. 1 and 2) consists of two closed boxes made of galvanised iron, a square foot in area and 2 inches in height, with transverse partitions soldered to the top and reaching nearly to the bottom. The partitions are $\frac{3}{4}$-inch apart, and extend from one side to within an inch of the opposite side each way alternately. Large stopcocks at the two ends of one of these sides provide inlet and outlet. By this arrangement the gas travels in each box a distance of about 15 feet over the surface of the liquid.