

fishery; and Mr. Samuel concludes that he is "not certain that salps were the direct cause of the ill effects of our herring fishery," though he goes on to say that salps may consume the minute organisms on which the herring feed, a statement also requiring proof. He supposes that the salps float on the surface of the water only—which they certainly do in fine, calm weather with a smooth sea, their contractions breaking the surface like tremors on molten glass. But the moment a storm of wind and rain sets in they disappear from the surface, and they may be beached in long lines six or more inches deep on the tidal margin like masses of boiled sago. In ordinary calm weather, again, one might look from a boat into the deep water of the Hebridean lochs and observe at all depths chains of salps and solitary individuals moving slowly therein as well as at the surface. Indeed, when the climax of the invasion was reached the sea in Lochmaddy for long distances resembled boiled sago, and with every stroke of the oars the salps rose from the water and rolled like glassy crystals from the blades. Further, swarms of gulls swooped down on the larger salps and picked out the nucleus (containing the stomach and the heart), leaving the victims to continue their slow, gliding motion as if nothing had happened. Moreover, many of the littoral animals greedily feed on the salps, even the little stony coral (*Caryophyllia*) having its soft tissues above the corallum distended to bursting with salps.

What the gulls and invertebrates delight in, surely fishes, and more especially herrings, do not despise, for, as first suspected by Dr. H. C. Williamson, long on the scientific staff of the Fishery Board for Scotland, and now on that of the Canadian fisheries, the herrings, less adept than the gulls in dissecting out the nucleus, swallow the salps—nucleus and all. Instead, therefore, of being a scourge, which swept the herrings from their wonted haunts, the salps would rather prove a welcome source of food.

W. C. MCINTOSH.

Vernier Wireless Time-signals.

THE Colaba Observatory has had under regular observations the time-signals broadcasted from Eiffel Tower and Nauen. A good deal of confusion was sometimes caused when the Observatory clock, which showed almost perfect agreement with the ordinary signals (old system) transmitted from Eiffel Tower between 22 hr. 44 min. and 22 hr. 49 min. G.M.T., received here between 4 hrs. 14 min. and 4 hrs. 19 min. Indian Standard Time, showed a considerable difference, occasionally so much as 0.8 of a second, when compared about an hour later with the Nauen signals (international system), which end at Greenwich midnight. The rate of the clock is so small that during the interval of an hour the clock developed negligible error; the difference between the two stations was consequently considered unfortunate, although this difference was ordinarily small.

The question naturally arises what order of accuracy an observatory should attempt in its time determination. Both Eiffel Tower and Nauen transmit vernier time-signals which enable one to obtain very accurate comparisons, the probable error not exceeding 1/100 of a second, but if these two stations themselves differ by even 0.1 of a second, the accuracy attainable from the vernier signals becomes meaningless. As Eiffel Tower transmits the exact times of the first and the last of the series of 300 dots, and Nauen does not, and as Eiffel Tower time shows a better agreement with

Bombay time, greater reliance has been placed by the Observatory on Eiffel Tower signals than on the Nauen. It would be interesting to know the experience of other institutions in this matter.

S. K. BANERJI.

The Observatory,
Bombay, April 9.

THE question raised by Mr. Banerji is certainly important from the point of view of exact astronomy, but it is not new. It was fully discussed several years ago, and at Rome in 1922 the geodesists stated that field operations with small instruments in the open did not show anything like the large range shown by the fixed transit circles of the leading observatories. It was conjectured that the confined air in the transit circle rooms might cause some *lateral refraction through irregular stratification*. At a recent meeting of the Royal Astronomical Society Prof. Sampson put the discordances down to abnormalities in the level determinations, but the Astronomer Royal found it difficult to accept this suggestion. It appears from Mr. Banerji's letter that he has missed the earlier discussion.

Part of the difference between the different national observatories arises from the use of different solar tables, and consequent difference in the reduction from sidereal to mean time. This amounts to as much as 0.06 sec.

There is the further point that the daily time-signals necessarily rest on *preliminary* values of the instrumental errors. There is not time to discuss these fully before sending out the signals. The error from this source may approach 0.10 sec.

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The Sound of Lightning.

CAPT. C. J. P. CAVE's letter in NATURE of May 23 reminds me of a storm at Little Shelford in 1915. I had waited for it to stop before I cycled in to Cambridge, and I started when there was clear blue sky in the zenith. An unexpected flash struck from the rear edge of the cloud before I had reached the garden gate, and damaged a tree within a hundred yards of me, near the village post office. The thunder was almost immediate, but was definitely preceded by a noise which I said was like "a sudden rending of calico"; Mr. Cave's "swishing" noise would also describe it. I was working on sound-ranging at the time, and thought the cause of the noise was probably analogous to the explosion wave, travelling faster than sound, which disturbs sound-ranging calculations for the last few yards of a gun's position.

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Hypothecate.

If a man prefers long words to short, who shall blame him? If he thinks Greek compounds more suited to the style of a learned paper, let us not hurt his dignity by carping. But we have a right to ask that he shall use such words correctly. Therefore it may be urged without offence that the many who like to write the word "hypothecate" when they mean "suppose" should first look that word up in the dictionary.

ONE WHO HAS DONE SO.