

through the earth passes in and out through the receiving apparatus. The Admiralty station is, of course, comparatively near, and the signals are very powerful. This explains why it is only Admiralty signals that I am able to receive by this method.

I am unable to agree with Mr. Lander in his remarks as regards tuning, as I find that with my bedstead aerial it is just as easy to tune in and out such signals as I am able to receive as it is with my proper aerial, which is suspended on poles above the roof of the house. The Eiffel Tower signals are always difficult to tune out, for the reason, as I suppose, that they are of irregular wave-length, while I find it impossible to tune out the Admiralty by reason of its power and proximity. Norddeich and other unidentified signals that I obtain are, however, tuned in and out both with the bedstead aerial and with the other with equal facility.

For time signals very accurately tuned waves, such as are sent out by Norddeich, are perhaps not altogether an advantage, as badly tuned waves, such as are sent out by the Eiffel Tower, are much more easily picked up by all and sundry.

A. A. CAMPBELL SWINTON.

66 Victoria Street, Westminster, S.W., July 7.

A Mechanical Vacuum-Tube Regulator.

MAY I supplement Mr. Campbell Swinton's letter in NATURE of June 26? The device of sliding a glass sleeve over the kathode for the purpose of varying the hardness of a discharge tube was also used and fully described by Wehnelt in 1903 (*Deutsch. Phys. Gesell. Verh.*, 5, 14, p. 259), some five years after Mr. Swinton.

The important part that the electrification on the walls plays in a discharge tube is not, I think, generally realised; and Mr. Swinton is not quite right in assuming that Mr. Whiddington's explanation is novel.

The electrification on the glass walls adjoining the kathode, and its concentrative effect on the beam of kathode rays, were remarked by Goldstein in 1901 (*ibid.* 3, 15, p. 192).

I remember some half-dozen years ago, Sir J. J. Thomson, in one of his lectures at Cambridge, gave a similar explanation of the formation of the fine pencil of kathode rays which can be seen crossing the bulb from the centre of the kathode in a soft X-ray tube. He attributed the effect entirely to the negative electrification of the glass round the kathode. The pencil of rays is as definite with a plane kathode as with a concave one.

But X-ray tube-makers have long been aware that, by withdrawing the kathode from the bulb into a side tube, the discharge can be hardened. In the earliest X-ray bulbs, the kathode was always mounted in the body of the bulb; but the advantages of a side tube had been realised by 1896, and the design has since been universally adopted.

Mr. Swinton was also responsible about 1897 for another adjustable form of X-ray bulb, in which, instead of a sliding sleeve, a movable kathode could be advanced in or out of a side tube. The bulb is at present in the Röntgen's Society's historical collection in the South Kensington Museum.

G. W. C. KAYE.

June 28.

In order to remove the possibility of any misunderstanding that may arise from Mr. A. Campbell Swinton's letter in NATURE of June 26 (p. 425), may I state that the mechanical vacuum-tube regulator is *not* claimed by me as new in the paper referred to. If Mr. Campbell Swinton will read the actual paper he

NO. 2280, VOL. 91]

will find it clearly stated that the regulator was discovered by him.

RICHARD WHIDDINGTON.

St. John's College, Cambridge, July 7.

The Humphrey Owen Jones Memorial Fund.

THE committee formed to carry out the generally expressed desire that some suitable memorial of the late Humphrey Owen Jones, F.R.S., should be established, has received subscriptions amounting to about 3600l. It is proposed to devote the sum collected to the endowment of a teaching post in physical chemistry in the University of Cambridge.

The committee desires to close the subscription list at the end of this month, and requests further intending subscribers to send their contributions to the account of the H. O. Jones Memorial Fund, Messrs. Barclay and Co.'s Bank, Cambridge, before that date.

W. J. POPE

(Chairman of the Committee).

The Chemical Laboratory, Cambridge, July 7.

Smithsonian Physical Tables.

ATTENTION was directed by Mr. C. T. Whitmell on p. 320 of NATURE of May 29, to a "very awkward error" in the Smithsonian Physical Tables (1896). The institution is always glad to have attention directed to errors for correction in subsequent editions, but as this particular error does not appear in the first revised, second, third, fourth, and fifth editions, it seems rather unfortunate to have discredit thrown on the tables through an error long since corrected.

C. D. WALCOTT,

Secretary.

Smithsonian Institution, Washington, U.S.A.,

June 21.

MODERN VIEWS OF ELECTRO-THERAPEUTICS.

DURING the last few years our views upon the true meaning of the action of electricity upon living subjects have been growing much clearer. We begin to see the principles upon which our practice should be based, and already, as a consequence of this, our methods are changing and our results are growing more valuable.

There are two factors which have brought this about. One is the recognition of the importance of the theory of ions in all matters which concern the movement of electric currents in living tissues, and is due to the genius of Leduc, and the other is the recognition of the thermal action of high-frequency currents, an action which remained unappreciated, even if not unknown, until it was insisted on and emphasised by Nagelschmidt. It is upon these two basic facts, the chemical or ionic effects and the thermal effects of electric currents, that the electro-therapeutics of the future will be established.

First, as to the chemical aspect of the medical applications of electric currents. To begin with, all movements of current in the body, whether the currents are direct, interrupted or alternating, are ionic movements pure and simple, and their effects are due to the chemical displacements produced. We may not speak of effects which are additional to or independent of the ionic movement, for such effects do not exist. The current in the body is the double ionic movement only. The treatment