side (or within the interior surface of the stratum) with equal force in opposite directions.

On the Corrosion of Copper-sheeting by Sea-water, and on Methods of preventing this Effect; and on their Application to Ships of War and other Ships. *By Sir* Humphry Davy, *Bart. P.R.S.* Read January 22, 1824. [*Phil. Trans.* 1824, *p.* 151.]

When copper sheeting, however pure the metal may be, is exposed to sea-water, a green rust is formed upon it; which, when washed off, is replaced by a similar substance, till the whole of the metal is thus destroyed by corrosion. To prevent this effect, the President avails himself of the modification of chemical affinities, derived from electrical power; and in pursuing his researches in relation to this subject, he found the above-mentioned action upon copper counteracted by any weak negative electricity easily excited in it by the contact of a surface of tin not exceeding $\frac{1}{100}$th that of the copper, and made part of an electric circuit in sea-water. Other metals may be substituted, but the facility with which a perfect contact is made by solder with tin, and the facility with which its submuriate detaches from the metal, induce Sir Humphry Davy to regard it as best adapted to the purpose. He observes, further, that the cause which prevents the oxidation of the copper will also probably prevent the adhesion of marine animals and of vegetables. After adverting to the unequivocal and satisfactory results of his experiment made upon a small scale, the author states that the Lords Commissioners of the Admiralty have enabled him to make arrangements for pursuing them upon a very extended plan.

A finite and exact Expression for the Refraction of an Atmosphere nearly resembling that of the Earth. *By* Thomas Young, *M.D. For. Sec. R.S.* Read February 5, 1824. [*Phil. Trans.* 1824, *p.* 159.]

Having shown that if the pressure of the atmosphere be represented either by the square, or by the cube of the square root of the density, the astronomical refraction may be attained in a finite equation; and having adverted to Mr. Ivory's computation of the refraction with the assistance of converging series, and several transformations from an equation which expresses the pressure in terms of the density and of its square, Dr. Young proceeds to observe, that if we substitute for the simple density the cube of its square root, we shall represent the constitution of the most important part of the atmosphere with equal accuracy, although this expression supposes the total height somewhat smaller than the truth; and that we shall thus obtain a direct equation for the refraction, which agrees very nearly with Mr. Ivory's table, and still more accurately with that in the Nautical Almanac, and with the French tables.

At the horizon the refraction is equal to $33' 49''{\cdot}5$, which is only $1''{\cdot}5$ less than the quantity assigned by the French tables and in the

Nautical Almanac; while Mr. Ivory makes it 34′ 17″·5. Again, for the altitude 5° 44′ 21″, we obtain 8′ 49″·5 for the refraction; while the Nautical Almanac gives us 8′ 53″, and Mr. Ivory's table 8′ 49″·6. The author, however, observes that there is no reason for proceeding to compute a new table by this formula, since the method employed for that in the Nautical Almanac is in all common cases more compendious; and even if it were desired to represent Mr. Ivory's table by the approximation there employed, we might obtain the same results, with an error scarcely exceeding a single second, from an equation of the same form.

The Bakerian Lecture. On certain Motions produced in Fluid Conductors when transmitting the Electric Current. *By* J. F. W. Herschel, *Esq. F.R.S.* Read February 12, 1824. [*Phil. Trans.* 1824, *p.* 162.]

In the first paragraphs of this lecture, Mr. Herschel describes the phenomena that result on placing a portion of mercury covered with sulphuric acid between the voltaic poles immersed on opposite sides of the globule of metal, but in contact with the acid only. They consist in active motion of those particles of the acid in contact with the mercury, while the superficial molecules of the metal continually radiate from the point nearest the negative pole, and darting to the positive pole return along the axis. The author particularly notices several singular appearances resulting from this current, and shows them to be independent of any electro-magnetic vortices, to which, at first sight, they present considerable analogy. They are incomparably more forcible, in proportion to the electric powers used, than the motions produced by the action of magnets; hence, they furnish an extremely sensible test of the development of feeble Voltaic powers not easily rendered sensible by other means.

The author next describes the appearances observed in cases where other liquids and metals are used, and adverts to the influence of several causes upon the uniformity of the results. Among these, impurity in the mercury is especially noticed, which should not only be carefully distilled, but also well washed with dilute nitric acid. Mercury thus prepared, and placed in the current as before, exhibits phenomena varying with the nature of the liquid;—generally speaking, currents are produced radiating from the point nearest the negative pole, which are most violent in acids, and less in saline solutions, in proportion as the electro-positive energy of the base is greater. In many liquids a counter-current from the positive pole is observed; but if either pole be brought in contact with the mercury, no currents are observed from the point of contact, but strong ones are perceived to radiate from the other. If the negative pole touch it, it amalgamates with the mercury, which remains bright; if the positive, the mercury rapidly oxidizes; and in both cases currents are produced.

Mr. Herschel proceeds to observe, that when mercury is electrized