the galls, and refers (by name simply) to the gall-forming animals; he arranges the galls according to the families of plants affected; he supplies more than a thousand serviceable illustrations, a statement of the geographical distribution of each gall, and the indispensable bibliographical references. The second volume is in the press; the first volume deals with the galls of cryptogams, gymnosperms, monocotyledons, and the dicotyledons from Ranunculaceæ to Rosaceæ. The work will be a great boon to entomologists, botanists, foresters, and agriculturists. We hope that the author will not write *finis* to his *magnum opus* without discussing, as he is so competent to do, the fascinating biological problems which are raised by the study of galls, crowning his work of description with an essay of interpretation.

Practical Coastal Navigation, including Simple Methods of finding Latitude, Longitude, and Deviation of Compass. By Comte de Miremont. Pp. 88. (London: J. D. Potter, 1908.) Price 4*s*.

IN this small volume Comte de Miremont has collected an enormous amount of useful information and what might be called tricks of the trade, which tell the young navigator everything that has been found useful in coastal navigation after years of experience.

The book is excellently arranged, and the explanations are simple. Besides the various chapters on actual coastal navigation, deviation and rule of the road, and weather forecasting in home waters, are most ably explained.

The book should find a place in every chart-house and navigation school. Comte de Miremont is to be highly congratulated on having produced such a useful aid to mariners, and to those wishing to become efficient in this particular art. H. C. LOCKYER.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Radiation of the Active Deposit from Radium through a Vacuum.

WHEN the radium emanation is transformed into radium A, the process is accompanied by the emission of α particles with a velocity of $1\cdot70\times10^9$ centimetres per second (Rutherford, *Phil. Mag.*, October, 1906). The portion of the atom from which the α particle has been emitted, which constitutes the radium A, must therefore be subjected to considerable shock and recoil in a direction opposite to that in which the α particle is projected. If we further consider that the mass of the α particle is $4(H=1)$, and that of the active deposit of the order 100, it follows that at the moment of its formation this product must be travelling with a velocity of the order 10^7 centimetres per second. In ordinary circumstances, when the emanation is mixed with air at atmospheric pressure, the radium A particle will possess only sufficient energy to permit it to travel a fraction of a millimetre before being stopped by collision with air molecules. On the other hand, at very low pressures, these particles should travel considerable distances without being stopped by the rarefied air, and come to rest on the enclosure containing the emanation. These particles should, in fact, constitute a type of very easily absorbed radiation. It has been the object of some experiments which we have recently performed to demonstrate directly the existence of this radiation.

The emanation from a fairly large quantity of radium was condensed at the bottom of a wide glass tube by immersing its end in liquid air. A brass plate, which just fitted into the glass tube, was suspended, in a high vacuum, a few centimetres above the condensed emanation so as to expose it to the bombardment of the active deposit particles being fired up the tube. After a suitable exposure the plate was removed, and its activity tested in the usual manner by a quadrant electrometer. The surface of the plate exposed to the emanation was always found to be highly radio-active.

Now this in itself would afford no evidence of the effect sought, for it is well known that when a large quantity of radium emanation is condensed in liquid air, the condensation is by no means complete, and there always exists in the vessel, above the condensed emanation, a considerable quantity of emanation in the gaseous state. A plate situated above the emanation as described above must therefore of necessity become radio-active on this account. But it was always found that the activity of the surface of the plate facing the emanation was greater than that of the opposite side, and it seems quite certain that this excess of activity is due to the direct radiation of the active deposit on to the plate. The ratio of the activity of the surface turned towards the emanation to that turned away from it has been found, under suitable conditions, to be as great as 50 to 1. The exact ratio obtained depends, of course, on a variety of experimental conditions, but in all circumstances the activity of the surface of the plate turned towards the emanation exceeded that of the reverse side. Moreover, by interposing a screen between the emanation and the plate, the excess activity collected on the surface of the plate turned towards the emanation could be completely obliterated. Experiments have been made at different pressures, and it has been found that the radiation is cut down to one-twelfth by traversing about 8 centimetres of air at a pressure of 1·15 millimetres of mercury. The same distance of air at 2 millimetres pressure is sufficient almost completely to stop the radiation.

These experiments give rise to a number of interesting questions which it is not yet possible to answer with any certainty. In the first place, it seems probable that when the emanation is condensed at the bottom of an evacuated tube, the attendant phenomena must be somewhat complicated, for when in radio-active equilibrium the emanation will be mixed with all its decomposition products. At every stage in the radio-active series at which α particles are expelled, some of the residual atoms should be fired up the tube. Although it is not yet possible to speak with certainty, it would seem that both radium A and radium B are projected up the tube on to the plate exposed to the radiation.

Another question of importance also arises as to whether the particles projected from the emanation are charged or not. Some experiments have already been made on this point with the object of deflecting the radiation by an electric field; but the difficulties are considerable, and no definite evidence has yet been obtained. We hope, however, that these difficulties will not prove insuperable.

S. RUSS
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January 9.

The Isothermal Layer of the Atmosphere.

IT seems to me that in NATURE of January 7 (p. 281) Mr. Dines successfully defends his simple, compact, but extremely efficient apparatus from the suspicions that have been levelled at it. The tests of the instrument before and after use show that it truly records the temperatures and pressures to which it is reduced. Mr. Dines is therefore entitled to call for adequate discussion of the most marked outcome of the experiments—the fact that in nearly all cases the minimum reading of temperature is reached long before the maximum height in the ascent, and long after in the descent. To suggest that the thermometer or the barometer may be slightly out is really to evade the problem.

Taking, then, the readings as fairly accurate, do they prove the "isothermal layer"? What are the circumstances? To the best of my knowledge they are these:—the instrument is screened by a polished metallic cylinder open at top and bottom, the centre of which it occupies, and the draught of air produced by the up-rush and down-rush of the balloon is relied on to ensure that the thermograph, which is of light metal strip, shall take the