GREIFSWALD.—The University has received a grant of 381,000 marks for a new library building, and 200,000 marks for the construction of a physical laboratory.

SCIENTIFIC SERIALS

Bulletin of the Nuttall Ornithological Club. A Quarterly Journal of Ornithology. Vol. III. January, No. 1.—This journal, on entering upon its third volume, has increased its quarterly numbers from a thin part of twenty-four pages to a part containing forty-eight pages and a coloured plate. It will continue, as before, under the editorial management of Mr. J. A. Allen, assisted by Prof. Baird and Dr. E. Coues, and it is intended that the volume for the current year should contain an exhaustive *résumé* of the current literature relating to North American Ornithology. The present number contains—Dr. E. Coues: On *Passerculus bairdi* (with plate), and *P. princeps*.—H. W. Henshaw on the species of *Passerella*.—W. A. Cooper: On the breeding of *Carpodacus purpureus*, var. *californicus*.—W. Brewster: On the first plumage of North American birds.—J. A. Allen: On Wallace's theory of birds' nests.—N. S. Goss: Breeding of the duck hawk in trees.—Notes of recent literature and general notes.

Reale Istituto Lombardo di Scienze e Lettere, Rendiconti, vol. xi. fasc. iii.—On the action of so-called catalytic force viewed according to the thermodynamic theory, by M. Tommasi.—Study on the dominant diseases of vines, by M. Garofalo and Cattaneo.—On the chronology of Tyrrhenian volcanoes, and on the hydrography of the Val di Chiana previously to the miocene epoch, by M. Verri.—On the permanent magnetism of steel at different temperatures, by M. Poloni.—On the plasmogonic production of leptothrix and leptomitrus, by M. Cattaneo.—On the refrigeration of pulverulent metallic solids (continued), by M. Cantoni.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, February 28.—“On the Reversal of the Lines of Metallic Vapours,” by G. D. Liveing, M.A., Professor of Chemistry, and J. Dewar, M.A., F.R.S., Jacksonian Professor, University of Cambridge. No. I.

In order to examine the reversal of the spectra of metallic vapours, the authors observe the absorptive effect produced on the continuous spectrum emitted by the sides and end of the tube in which the volatilisation takes place. For this purpose they use iron tubes about half an inch in internal diameter, and about twenty-seven inches long, closed at one end, thoroughly cleaned inside, and coated on the outside with borax, or with a mixture of plumbago and fireclay. These tubes are inserted in a nearly vertical position in a furnace fed with Welsh coal, which will heat about ten inches of the tube to about a welding heat, and they observe through the upper open end of the tube, either with or without, a cover of glass or mica. To exclude oxygen, and avoid as much as possible variations of temperature, they introduce hydrogen in a gentle stream through a narrow tube into the upper part only of the iron tube, so that the hydrogen floats on the surface of the metallic vapour without producing convection currents in it. By varying the length of the small tube conveying the hydrogen, they are able to determine the height in the tube to which the metallic vapour reaches, and to prevent further displacement of the vapour, and thus to maintain different lengths of the iron tube full of metallic vapour at a comparatively constant temperature for considerable periods of time.

By this means the following observations have been made up to the present time:—

The first metal experimented on was thallium, one of the most volatile of metals. After arranging the current of hydrogen so as to keep the tube free from air, but without any rapid movement of the gas, they saw the characteristic line reversed, and maintained it so for a considerable time.

The metal indium, closely allied in its behaviour and volatility to thallium, was next examined, and they observed the bright blue line reversed. This was most plainly visible when that portion of the vapour which was nearest to the sides of the tube was looked through.

They had great difficulty in preventing the oxidation of magnesium in the tube, and in using tubes wider than half an inch,

did not succeed in getting any reversal, but with half-inch tubes the *b* lines were clearly and sharply reversed, also some dark lines, not measured, seen in the blue. The sharpness of these lines depended on the regulation of the hydrogen current, by which the upper stratum of vapour was cooled.

A piece of metallic lithium was introduced, and gave no results. Sodium was next added in the same tube, and this did not bring out the reversal of the lithium lines. Similarly, chloride of lithium and metallic sodium, introduced together, gave no better results. To a tube containing potassium vapour, some lithium chloride was added, but no lithium line appeared. On adding metallic sodium to this atmosphere, and more lithium chloride, the bright-red lithium line appeared sharply reversed, and remained well defined for a long time. It is worthy of observation that the lithium line was only reversed in a mixture of the vapours of potassium and sodium, and it seems highly probable that a very slightly volatile vapour may be diffused in an atmosphere of a more volatile metal, so as to secure a sufficient depth of vapour to produce a sensible absorption. This would be analogous to well-known actions which take place in the attempt to separate organic bodies of very different boiling points by distillation, where a substance of high boiling-point is always carried over, in considerable quantity, with the vapour of a body boiling at a much lower temperature. It is a matter for future investigation how far chemical interactions taking place in a mixture of metallic vapours affect the volatility of a third body, and what relation, if any, this may have to such phenomena as the increased fusibility of mixtures of salts of potassium and sodium, and the well-known fluidity of the alloy of those metals.

As the authors have had occasion to use sodium and potassium in their tubes, they have had opportunities of observing the absorption spectra of these metals, and they find that there is a great deal yet to be observed in regard to these spectra. Up to the present time they have not observed any of the appearances noted by Lockyer, “On a New Class of Absorption Phenomena,” in the *Proceedings* of the Royal Society, vol. xxii., but they have repeatedly noted the channelled-space spectrum of sodium described by Roscoe and Schuster, in the same volume of the *Proceedings*. They observed in their tubes no channelled space absorption by potassium, but continuous absorption in the red and one narrow absorption band, with a wave-length of 5,730, not corresponding with any bright line of that metal.

With reference to the absorption spectrum of sodium vapour they remark that it is by no means so simple as has been generally represented. The fact that the vapour of sodium in a flame shows only the reversal of the D lines, while the vapour, volatilised in tubes, shows a channelled space absorption, corresponding to no known emission spectrum, appears to be part of a gradational variation of the absorption spectrum, which may be induced with perfect regularity. Experiments with sodium, carried out in the way described, exhibit the following succession of appearances, as the amount of vapour is gradually diminished, commencing from the appearance when the tube is full of the vapour of sodium, part of it condensing in the cooler portion of the tube, and some being carried out by the slow current of hydrogen. During this stage, although the lower part of the tube is at a white heat, we have always noticed, as long as the cool current of hydrogen displaced metallic vapour, that, on looking down the tube, it appeared perfectly dark. The first appearance of luminosity is of a purple tint, and, with the spectroscope, appears as a faint blue band, commencing with a wave-length of about 4,500, and fading away into the violet. Next appears a narrow band in the green, with a maximum of light, with a wave-length of about 5,420, diminishing in brightness so rapidly on either side as to appear like a bright line. This green band gradually widens, and is then seen to be divided by a dark band, with a wave-length of about 5,510. Red light next appears, and between the red and green light is an enormous extension of the D absorption lines, while a still broader dark space intervenes between the green and the blue light. The dark line in the green (wave-length about 5,510) now becomes more sharply defined. This line appears to have been observed by Roscoe and Schuster, and regarded by them as coinciding with the double sodium line next in strength to the D lines, but it is considerably more refrangible than that double line. In the next stage, the channelled space spectrum comes out in the dark space between the green and blue, and, finally, in the red. Gradually the light extends, the channels disappear, the D lines absorption narrows, but still the dark line in the green is plainly