carefully examined it, blowing back the plumage until the skin could be seen. It is also safe to say, doubtless, that the cast-off feathers were not eaten by the bird itself. Hence it follows that unless the previous plumage was made up of only two tail and eleven body feathers, both of the former on the same side—which was certainly not the case—*my Bobolink was unquestionably an instance of color-change in the plumage without moult.*"

Dr. Chadbourne had already presented evidence tending towards the same end in *the Auk* for October, 1896, and January, 1897, wherein he discusses change of color in the Screech Owl, *Megascops asio.*

In *The Ibis* for October, 1896, Mr. John G. Millais also discusses the problem of color-change without moult, describing and figuring feathers from the Eared Grebe, *Colymbus auritus*, and Sanderling, *Calidris arenaria*, showing the great probability of such change taking place. The word *probability* is used advisedly, for Mr. Millais figures feathers in different stages from different birds, and while this evidence may be very strong it can not in the nature of things be so conclusive as change of color in the plumage of a bird kept under observation day after day.

In spite of all that has been written, the moulting and change of color in birds is comparatively little known, and it remains a fine field of research for the investigator who is willing to spend his time in the patient and careful collection of facts.

F. A. L.

NOTES ON INORGANIC CHEMISTRY.

FOR some time past there has been a tendency on the part of an increasing number of chemists to attack the problems of inorganic chemistry, profiting by the light which the study of organic chemistry has thrown upon the carbon and nitrogen atoms. This is an encouraging tendency from the standpoint of theoretical chemistry, for while the devotion of by far the largest proportion of chemists, for several decades down to the present time, to organic chemistry has widened vastly our knowledge of organic compounds and the carbon atom, yet the study of all other atoms is even more necessary for the theory of chemistry. Relatively very few inorganic compounds have been studied and some of our most familiar reactions are illy understood. So far from the inorganic field having been long ago worked out and exhausted, it is here that the chemistry of the future will find its most prolific harvest. Yet the field is far harder to till and less productive of immediate results.

THE *Berichte* of the German Chemical Society might almost seem to be devoted to organic chemistry, so large is the preponderance, yet we find that the inorganic field is not wholly neglected. In the last number Muthmann and Seitter contribute an investigation of the sulfid of nitrogen, which is in part a development of earlier work of Demarçay. When nitrogen sulfid N_4S_4 is treated with chlorin a theachlorid $N_4S_4Cl_4$ is formed, as shown by Andreocci. When sulfur chlorid is used, a compound of the formula N_3S_4Cl is obtained, and from this a series of derivatives, including the bromid, iodid, nitrate and thiocyanate. There thus appears to be a comparatively stable univalent group, N_3S_4, which the authors believe to have a ring formula analogous to that of benzine.

IN the same *Berichte*, Pawlewski, of Lemberg, gives a careful study of the physical properties of sulfuryl chloride, SO_2Cl_2, and some of its chemical reactions. Professor Söderbaum, of Gothenburg, in the same number describes a reaction between acetylene and cupric salts. The cuprous acetylid has been long known, but that acetylene gives a precipitate with cupric salts has

apparently been overlooked. The compound formed seems to have a very complex formula, being represented by $C_{17}Cu_8H_4O_8$. It is more explosive than the corresponding cuprous compound and, unlike it, on treatment with dilute acid yields very little acetylene. It gives, on the contrary, a humus-like substance of a formula of about $C_{12}H_4O_3$, which resembles both humic acid and the so-called graphite hydrate obtained from the graphite of cast iron. It would seem to be an unique case of the condensation of acetylene, at ordinary temperature under the influence of a copper salt, to a compound of high molecular complexity.

J. L. H.

ASTROPHYSICAL NOTES.

In No. 367 of the Proceedings of the Royal Society is a note by Professor Oliver Lodge, read on February 11th, in which he calls attention to the notable discovery by Professor P. Zeeman, of Amsterdam, that lines in the spectrum of a flame may be broadened when a magnetic field is concentrated upon the flame.

Zeeman's paper appears in the *Philosophical Magazine* for March (Vol. 43, pp. 226–239). He alludes to the fact that similar experiments were the last researches of Faraday, in 1862. With the relatively slight dispersion then available, however, the effects could not have been observed.

Sodium and lithium were used by Zeeman, and the broadening effects were observed in both the emission and absorption spectra, which were obtained from a powerful concave grating.

The experiment was also tried on the band spectrum of absorbing iodine vapor, with negative results, which, however, confirmed the accuracy of the experiments with sodium. The widening of the sodium lines to both sides amounted to about $\frac{1}{40}$ of the distance between D_1 and D_2 (that is, to about 0.15 tenth-meters). As the intensity of the magnetic field was about 10^4 c.g.s. units, there would be a positive and negative magnetic change of $\frac{1}{1000}$ of the period.

The theory of the motion of ions or electrons, whose vibrations are those of light, is discussed according to the views of Professor Lorentz, who pointed out to Zeeman that if the theory was true the edges of the widened lines ought to be circularly polarized in the direction along the lines of magnetic force, and plane polarized in directions normal to the lines of force. This was clearly shown by experiment to be the case, and it has been confirmed by Lodge, who also readily obtained the broadening effect in the sodium flame.

These researches are decidedly suggestive, and have an important astrophysical as well as physical application. The view is held by many that strong magnetic forces occur in the sun (and hence by analogy in the stars). Thus a new cause may perhaps be assigned for the wide range and variations in the breadth and intensity of spectral lines of celestial bodies.

E. B. F.

SCIENTIFIC NOTES AND NEWS.

LEGISLATION ON THE FOREST RESERVATIONS.

The Senate, on May 6th, adopted Senator Pettegrew's amendment to the Sunday Civil Appropriation Bill, suspending President Cleveland's order of February 22d, setting aside some 20,000,000 acres of timber lands in the Northwest as forest reservations. The N. Y. *Evening Post* calls this action 'monstrous,' and it seems to be generally misunderstood. The Senators from the States concerned favor forest reservations, but President Cleveland's order, with the laudable purpose of adequately celebrating Washington's Birthday and securing to his administration the credit of this important movement, seems to have been premature. The letter from the Secretary of the Interior to the President of the National Academy of Sciences requested an official expression of the Academy upon the following points: