prismatic cameras are not included, for the reason that the reduction of the photographs is not yet completed.

The second part, by Captain Chisholm-Batten, R.N., gives a full account of the observations made by the officers and men of H.M.S. "Melpomene"; four photographs of the corona, taken with different exposures, accompany the paper.

In the third part, Professor Pedler gives details of the spectroscopic observations which he made by eye with a 6-inch short focus lens and a grating spectroscope.

A general idea of the work at Viziadrug has already been given in a preliminary report.*

"A Comparative Crystallographical Study of the Double Selenates of the Series $R_2M(SeO_4)_2,6H_2O$.—Part I. Salts in which M is Zinc." By A. E. Tutton, B.Sc., F.R.S. Received March 5, —Read March 15, 1900.

(Abstract.)

In this communication are presented the results of the investigation of the group of salts of the above series in which M is represented by zinc, R being represented by potassium, rubidium, and cæsium. The investigation is similar to that which has previously been carried out for the double sulphates of the analogous series.† The work consists of very large numbers of measurements of the exterior angles of the crystals, determinations of density, refractive index, optic axial angle, orientation of optical ellipsoid, and effect of change of temperature on the optical properties, together with the calculation of all the morphological and physical constants derivable from the measurements. The main results are as follows:—

The morphological axial angle of the rubidium zinc salt is approximately the mean of the axial angles of potassium zinc and cæsium zinc selenate.

In the cases of thirty-three out of thirty-six angles between the exterior faces, the value for the rubidium zinc salt is intermediate between the values for the other two salts, and the exceptions are only apparent, being due to changes of opposite sign in adjacent angles following the rule.

The morphological axial ratios for rubidium zinc selenate are intermediate between the ratios of potassium zinc and cæsium zinc selenate.

The common habit of the crystals of the rubidium zinc salt is of an

* 'Roy. Soc. Proc.,' vol. 64, p. 27.

† 'Journ. Chem. Soc., Trans.,' 1893, 337, and 1896, 344.

intermediate character to the habits of the crystals of the potassium zinc and cæsium zinc salts.

An increase of density accompanies a rise in the atomic weight of the alkali metal, and it is greater for the replacement of potassium by rubidium than for that of the latter by cæsium in the proportion of 5 : 4.

The molecular volumes show a similar progression in the order of the atomic weights of the alkali metals, but the replacement of rubidium by cæsium is marked by the greater change.

The distance ratios (topic axes) indicate an extension of the distance separating the structural units in all three axial directions, the maximum being along the symmetry axis.

All these rules relating to the exterior morphology of the crystals are precisely analogous to those previously shown to apply to the double sulphates.

The optical ellipsoid (indicatrix) is found to rotate about the symmetry axis, when the atomic weight of the alkali metal is raised. The amount of rotation is twice as great when cæsium replaces rubidium as when the latter replaces potassium.

The mean refractive index (mean of all three indices) of the rubidium zinc salt is intermediate between the mean indices of the other two salts.

The greatest change accompanies the replacement of rubidium by cæsium.

The double refraction diminishes at an increasing rate as the atomic weight of the alkali metal increases.

It follows from the above that the axial ratios of the optical indicatrix for the rubidium zinc salt are intermediate between those of the other two salts, the second replacement being accompanied by the greater change.

The optic axial angle of the rubidium zinc salt is almost exactly the mean of the widely different optic axial angles of the potassium zinc and cæsium zinc salts. The optic axes have a common plane, and the bisectrices are similarly situated, subject to the rotation of the whole ellipsoid already specified.

The optic axial angles show a progressive change on heating the section plates—namely, a slight increase in the case of the potassium zinc salt, a slight decrease in the case of the cæsium zinc salt, and an almost complete indifference to change on the part of the rubidium salt.

The whole of the specific and molecular optical constants of rubidium zinc selenate are intermediate between those of the potassium and cæsium zinc salts. The molecular refraction and dispersion increase at an accelerating rate with the rise of atomic weight of the alkali metal.

On instituting a comparison between the results now communicated and those formerly published for the triplet of zinc double sulphates, it is found that the replacement of sulphur by selenium is generally accompanied by a change in the morphological and physical constants similar to that which accompanies the replacement of one alkali metal by another of higher atomic weight. The changes due to the latter chemical change are often smaller in the selenate series than in the sulphate series, the greater weight of the initial molecule appearing to offer greater resistance to change. The intermediate character of the constants of the rubidium salt is, however, the invariable rule in both cases.

"An Experimental Inquiry into Scurvy."* By FREDERICK G. JACKSON and VAUGHAN HARLEY, M.D. Communicated by LORD LISTER, P.R.S. Received February 15,—Read March 1, 1900.

(From the Department of Pathological Chemistry, University College, London.)

The view that scurvy is caused by the want of fresh vegetables or lime juice, which has been the teaching of physicians and scientists in past years, would appear to require modification.

In the early part of this century, through the efforts largely of Lind, the better feeding of sailors led to the gradual disappearance of scurvy in the naval service, and from this and other observed facts it was conceived that the disease developed whenever individuals did not receive a sufficient quantity of fresh vegetables, or some substitute, such as lime juice, in the diet.

Garrod held that the cause of scurvy was a deficiency of potassium salts, while others believed the essential factor to be the absence of organic salts, which are present in fruits and vegetables.

Ralfe believed the absence from the food of malates, citrates, and lactates reduced the alkalinity of the blood, and thus was the cause of scurvy. It was proved, however, by analysis that the alkalinity of the blood was not diminished, and the majority of evidence showed no diminution in the quantity of potash salts in the scorbutic blood, so that these explanations had to be abandoned.

Neale, in an article on "Scurvy in the Arctic Regions," published in the 'Practitioner,' 1896, stated that "scurvy is a disease due to want of proper ventilation and want of proper blood nourishment; in fact, scurvy begins with anæmia, and its great antidote is fresh blood." He consequently did not consider that fresh vegetables were of such

* Towards the expenses of this research a grant was received from the Royal Society.