by five inches in size, is stamped and bent as shown in Fig. 1. There are runways to hold four slides. The lower edge is turned to support the lower ends of the slides. The upper edge is cut with semicircular notches to facilitate grasping the slides and is slotted between the slides and bent forward slightly where indicated by the dotted line so as to exert pressure against the upper ends of the slides, holding them in place so that they do not fall out if the holder is held upside down. As the upper ends of the slides are forced forward against the upper ends of the runways the lower ends are forced backward away from the runways so that the coverslips are not in contact with the runways. The slide labels are conspicuously in view at the upper ends of the slides. With the forefinger against the back of the holder and the thumb against the label a little pressure serves to disengage the slide and allow it to be withdrawn without scraping the coverslip against the runways. The holders containing slides may be filed along with cards bearing notes in any ordinary card-filing box or drawer of standard size for 3 x 5 inch cards as shown in Fig. 2. When so filed the slide labels are easily read without removing the slides or holders from the filing drawer. The surfaces of the slides are protected from contact with each other or with cards that may be filed with them, even though the slides may be without coverslips and sticky with immersion oil. About five hundred slides may be filed in one foot of drawer space. The device is equally useful for small or large collections of slides.

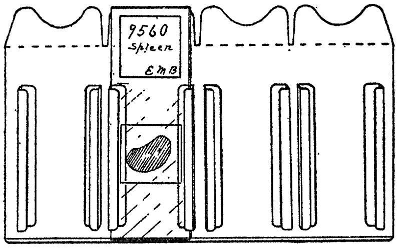

Fig. 1

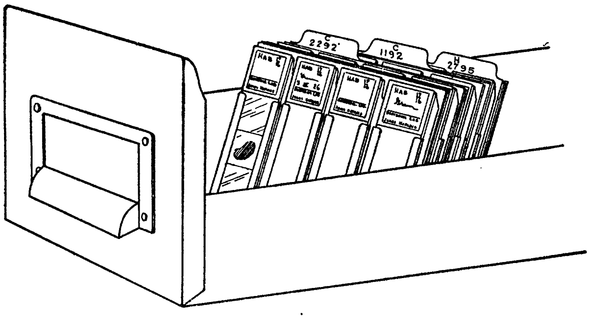

Fig. 2

No special equipment is needed other than the holders and these may be procured in any quantity desired and as needed. The filing cost per slide will probably be somewhat greater than when the cheaper slide boxes are used but less than that of special cabinets and filing drawers.

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A METHOD OF HANDLING SMALL OBJECTS PREVIOUS TO SECTIONING

Tiny marine eggs, such as those of cumingia, are fixed in shell vials measuring one and a half centimeters in diameter and three centimeters in height. The eggs settle rapidly to the bottom in most fixing fluids, and, after the proper interval of time the fixing fluid may be removed by tilting the vial and using a curved tipped pipette. The vial is next flooded with water or alcoholic solution of the desired strength. After each successive treatment the eggs sink to the bottom, and most of the fluid which covers them is easily withdrawn by means of the pipette. Upon reaching 75 per cent. or 85 per cent. alcohol, the vial is stoppered, a gummed label bearing the proper index is affixed and the stoppered end is dipped in melted hard paraffin deep enough to cover the label. The vial is thus sealed and the label protected by a film of hard paraffin.

When the worker is ready to dehydrate, clear and infiltrate his material, the stopper is removed from the vial, the preserving alcohol drawn off with a pipette, and the vial filled with 95 per cent. alcohol. The dehydrating and clearing fluids are added or withdrawn in the same manner after proper intervals of time, and the material flooded with melted paraffin. At this point it is well to slip a small elastic band tightly over the label, since the heat of the paraffin oven sometimes loosens a label. The paraffin may be changed as desired by using a warm pipette.

Thus far, the eggs have never left the vial in which they were fixed. For casting the material into paraffin blocks, small rectangular porcelain dishes in which artist's water colors are purchased will prove satisfactory. These little dishes with flaring sides measure approximately two centimeters in length, one and one half centimeters in length, and one half centimeter in depth. The bottoms and sides of these casting molds are lightly smeared with glycerine or vaseline. Paraffin is next withdrawn from the vial until only enough remains to fill the casting dish, the vial is passed rapidly once or twice over an alcohol flame, and its contents poured into the porcelain receptacle. At the proper moment, the paraffin is hardened by submerging under 70 per cent. alcohol or water. After hardening, the point of a scalpel inserted between the side of the dish and the paraffin, loosens the block and it readily drops out if the dish be inverted. The block may be trimmed immediately, or, slipped back into the original vial and left indefinitely.

By regulating the temperature of the paraffin at the time of casting, the worker may have his material either distributed evenly through the block or the eggs may be allowed to settle enmasse to the bottom of the dish.

Comparatively few eggs are lost when this method is followed. It is especially advantageous when lots of fifty or a hundred stages have to be carried through, since there is a minimum probability of different lots mixed, and the material is on file from the moment of fixation.

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SPECIAL ARTICLES

THE CHLORIDES OF RUTHENIUM

A YEAR and a half ago[1] Mr. F. N. Mercer and I published a paper in which we described a method of separating ruthenium quantitatively by solution in sodium hypochlorite and distillation in a current of chlorine. At that time we had not found any simple way of analyzing the solution of pure ruthenium which distils over, reduction methods failing owing to the presence of free chlorine in the solution.

Since that time I have found that if the distillate is absorbed in concentrated hydrochloric acid, the solution can be titrated with stannous chloride, thus affording a simple method of determining small quantities of ruthenium, and also, by using aliquot portions, of evaluating solutions of ruthenium in chloro-ruthenate form.

The reaction depends upon the fact that ruthenium tetroxide, RuO_4, is reduced in hydrochloric acid solutions to quadrivalent form, and that dilute stannous chloride reduces quadrivalent ruthenium to trivalent ruthenium, and no farther, even under quite variable conditions. The change in color of the ruthenium solution from deep red to rose is quite recognizable, but for accuracy a slight excess of stannous chloride is added, and the solution titrated back with iodine solution, starch paste being used as an indicator.

There has been much discussion regarding the different valence states of ruthenium and especially as to what is formed when the volatile tetroxide is reduced by hydrochloric acid. When the tetroxide is boiled with hydrochloric acid and potassium chloride added, there crystallizes out a salt which has, since the days of Claus, its discoverer, passed as K_2RuCl_5, derived from the pentachloro-ruthenous acid, H_2RuCl_5, this in turn being a derivative of ruthenium trichloride, $RuCl_3$. From this it has been naturally assumed that the valence of ruthenium in this compound is three. On the other hand, Krauss, as well as Remy, have conclusively proved that the ruthenium in RuO_4, on reduction by hydrochloric acid, is reduced only four valences. It has therefore been assumed that $RuCl_4$ (H_2RuCl_6) is first formed, and that the $RuCl_3$ (H_2RuCl_5) is the result of further reduction.

The result of titration with stannous chloride, however, shows that the ruthenium in both H_2RuCl_6 and H_2RuCl_5 (as supposed) is quadrivalent, each being reduced a single valence to the real H_2RuCl_5. With KCl (or other alkali chlorides) $K_2RuCl_5(H_2O)$, first recognized by me in 1901[2] and then called an "aquo"-salt, is formed. This must be recognized as the true pentachloro-ruthenite, crystallizing with one molecule of water, as would be expected from the Werner theory.

This was suggested by Charonnat in 1925,[3] on the basis of the reduction of the (supposed) K_2RuCl_5 by potassium iodide, and the formation of the aquo-salt by the action of hydrochloric acid on the oxalate, $K_3Ru(Ox)_3$, in which the ruthenium is undoubtedly trivalent. No analyses were published, however, to substantiate this observation, which was unquestionably correct, and it seems to have been overlooked.

Since the K_2RuCl_6 can be formed by the recrystallization of the (supposed) K_2RuCl_5 from very concentrated hydrochloric acid, and the K_2RuCl_5 is formed when the K_2RuCl_6 is recrystallized from dilute, or even moderately strong hydrochloric acid, and since the valence of the ruthenium is the same in both salts, it is probable, as Charonnat assumes, that the pentachloride salt is actually a hydroxy-salt, K_2RuCl_5OH, formed from the hexa-salt, K_2RuCl_6, by hydrolysis.

It is interesting to note that within wide limits the hexachloro-ruthenate is hydrolyzed to the extent of one chlorine atom only and that this product in water, in absence of hydrochloric acid, is further hydrolyzed to $RuCl(OH)_3$, while the true pentachloro-ruthenite, ("aquo" salt), is hydrolyzed only to $RuCl_2(OH)$.[4]

Fuller details of this research will appear later in the *Journal* of the American Chemical Society.

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[1] J. Amer. Chem. Soc., 47 (1925), 2926.

[2] *Ibid.*, 23 (1901), 781.

[3] Compt. rend., 181 (1925), 866.

[4] Lind and Bliss, *J.* Amer. Chem. Soc., 31 (1909), 868.