to this author this substance, called cardiolipin, is a new, nitrogen-free, sugar-containing phospholipid, with 4.11 per cent phosphorus.

In further publications (*4, 5*) Pangborn described another method of purifying the syphilis antigen, based on the precipitation of the cephalin fraction together with the antigen by $BaCl_2$ and eliminating cephalin by alcohol. After further purification a substance was obtained with the characteristics of syphilis antigen. This second "cardiolipin" contained no sugar but approximately the same amount of phosphorus as the "cardiolipin" of the first publication.

One of the authors and his co-workers elaborated between 1931 and 1936 (cf. *1*) several methods of purifying the syphilis antigen. Having applied two of these methods successively, a purified antigen preparation was obtained recently from the phosphatid fraction of alcoholic beef heart extract. The process of purification consisted of adsorbing the antigen on specially prepared aluminum hydroxide and eluting it in benzene. The antigen was then further purified by extracting it with petroleum ether from an acidulated 80 per cent alcohol solution. From 207 grams phosphatides 1 gram of a purified antigenic preparation was obtained, with only 0.01 per cent phosphorus, 0.25 per cent reducing substances (liberated by acid hydrolysis), and 40 per cent fatty acids (liberated by alkaline hydrolysis) (*1*).

It was shown in 1936 (*2*) that by extracting an 80 per cent alcoholic solution with petroleum ether, only a part of the antigen could be obtained in the petrol ether solution, another part still remaining in the hydroalcoholic phasis. Only after acidulating this phasis with HCl did the antigen disappear completely from it, entering into the petroleum ether phasis. We may assume, therefore, that the antigen occurs in two different forms in the alcoholic organ extract, *i.e.* acid and salt.

In recent experiments we have worked on the phosphatid fraction of 10 beef hearts, obtained by extraction with alcohol and precipitation with acetone. The antigen was absorbed on aluminum hydroxide and eluted in benzene. The substance obtained in this way was dissolved in 80 per cent alcohol and extracted at first without, and then with, acidulation.

We obtained in this way two fractions, which we shall call "petroleum ether fraction before acidulation" (P.E.N.) and "petroleum ether fraction after acidulation" (P.E.A.). Both fractions reacted with strongly positive sera. P.E.N. weighed 39 mg., and no phosphorus could be detected in it. P.E.A. amounted to 22 mg. with 0.1 per cent phosphorus. Both fractions were yellow oils which hardened rapidly, forming a transparent, soft film.

We assume that the small quantities of phosphorus found in our preparations correspond to impurities, as was the case with the reducing substances in our former experiment.

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A Cheap and Speedy Method of Cleaning Old Microscope Slides

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For years our Department has been faced with the problem of cleaning off old microscope slides made with Canada balsam. None of the solvents used (xylene, toluene, turpentine, and coal oil) has proved effective in less than two weeks, and the resulting mass of dilute balsam, slides, cover slips and slide labels provided another problem in cleaning up.

Recently while collecting ectoparasites of mammals by the method recommended to me by Dr. G. H. E. Hopkins, of Uganda, which originated from Dr. F. L. Werneck, of Brazil, it occurred to me to try this upon microscope slides; it worked like a charm and is proving a boon in our laboratories.

Dr. Hopkins' method of recovering ectoparasites from fur is to place portions of hide into hot, 10-per cent caustic soda; the soda dissolves the hair and fur, and the sludge is then washed through fine, stainless steel mesh which retains the parasites. I have used this procedure extensively for parasite recovery, with considerable success, and now it is proving invaluable for cleaning slides. A number of methods can be employed, but I use three 500-cc. beakers, two of 10-per cent caustic soda on tripods over low Bunsen flames, and one spare. The caustic is kept at nearly boiling point, and a row of slides, held in a spiral of copper wire with the two ends sticking out straight, is placed across the top of the beaker so that the glass is immersed for most of its length. A large number of slides, from 1 to 13 years old have been tested and the speed of action timed; the latter varies inversely as the age and the amount of balsam present. In the case of old slides with thick balsam, the labels and cover slips slide off in from 23 to 30 seconds; in year-old slides with little balsam, it may take up to two minutes for the cover slips to fall off. All slides made with very little balsam, irrespective of age, take longer than those with much balsam. The size of cover slip does not affect the speed of action.

24 × 50-mm. rectangles come off as fast or even faster than 18-mm. circles unless the long ones are overlapped by a label which is not entirely immersed in the caustic.

The slides must not be in contact or else the hot caustic cannot penetrate between them. If any cover slip does not drop off in two minutes, it can readily be shoved off with the edge of a slide.

When all cover slips and labels have fallen off, the beaker is left over the flame for about a minute or two longer, the slides are released from the spiral, the caustic soda is poured off into the spare beaker, and another set of slides in a holder is set to soak. In the meantime the beaker with slides and cover slips is held under a gentle flow of hot water in the sink. The hot caustic soda apparently saponifies the esters in the Canada balsam, and the hot water washes it all away, leaving both slides and cover slips beautifully clean. If any balsam remains adhering to the glass, it can usually be washed off between thumb and finger under the tap; occasionally an obstinate one must be dropped back into the hot caustic to soak.

By the time one has carefully washed 10 slides and their cover slips between thumb and finger under the tap and dried and boxed them, the next series of 10 is ready for washing. It is therefore unnecessary to have a larger setup.

A more convenient method than the one outlined above, would be to have a wire-gauze box of copper or stainless steel with a spiral or slotted holder on top, so that the whole thing could be suspended in a large beaker of caustic and the box and its contents lifted out instead of having to pour the alkali from one beaker to another. In the method just described, additional caustic solution has to be added from time to time to the beaker over the flame to make up for the amount washed away under the tap. This periodic addition of new solution seems to keep up the effectiveness of the hot bath, which does not become saturated and therefore impotent until many slides have been cleaned.

Solutions of 10, 15 and 20 per cent have been tried. The 10-per cent solution seems to work as well as the stronger ones. Leaving slides to soak overnight, or even for days, in cold caustic is quite ineffective and seems to render the balsam somewhat resistant to saponification when the slides are finally placed in a hot solution.

Letters to the Editor

Sources of Our Future Scientists

Vannevar Bush, Director of OSRD, has estimated in his recent report to the President (*Science, the endless frontier*) that the deficit of those who would have received a bachelor's degree in science or technology had reached 150,000, and that by 1955 there would be a loss of 17,000 who would otherwise have been given advanced degrees.

There is, however, one important element in the supply of future scientists which he did not consider. This is the source of the hereditary material, the necessary biological counterpart of the favorable educational environment which he discusses. All recent studies of this indispensable prerequisite for future scientists are alarming, indicating as they do that for the past century our most educated groups have failed to bear enough children to replace themselves. These studies have, of necessity, been based upon the ability to acquire a given amount of education, usually that represented by a college degree. For economic reasons, this test does not include all who might have become graduates, but it does indicate an intelligence level well above that of the average in the country. While there will obviously be exceptions, it seems fair to assume that the average scientific ability of the offspring will also be high, and that the surroundings and mental stimulation to which these children will be exposed will be favorable for the production of scientists.

While graduates of Yale in the early 1700's had averaged about 5 surviving children each, this record steadily decreased. For the classes graduating about 1825, 3.5 children were born to each graduate; for those graduating in the decade from 1870 to 1880 from Harvard, Wesleyan, Syracuse, and Yale, the children were well below the number necessary for replacement. For the Harvard classes of the 1890's, they had fallen to 1.45 per graduate. To secure later information, the writer has made a study of the five most recent Harvard classes to have issued their 25-year reports (The deficit in the birthrate of college graduates. *Hum. Fertility*, in press). These give statistics collected at a time when their families are nearly complete. A more favorable trend was found, with 1.67 children per graduate, but the offspring are still distinctly below the replacement level. Furthermore, it may be only a transient increase, since reports of the classes of 1931 and 1936 disclose that in the early years after graduation, their children were only 77 and 62 per cent of the per-capita rates of 1916 to 1920 for the same periods.