The method here described depends upon the use of a resilient surface for both inking and printing, and tends to obviate the difficulties mentioned.

The material employed for the pressure pad, as it will hereafter be called, is a variety of sponge rubber bearing the trade name of "Spongtex," which is sold by office-supply dealers[2] in the form of chair cushions. It is about 17 mm in thickness, with plane surfaces, one of which is covered with felt. For the purpose under discussion it should be cut into rectangular slabs of convenient size (*e.g.*, 15 x 15 cm), and the felt-covered sides of two slabs glued together with a liberal supply of Le Page's glue, applied to both slabs. Too much weight placed on the slabs while the glue is drying will result in subsequent warping of the pressure pad.

The materials required for printing are:

(1) Two pieces of plate glass (or polished metal), one about 15 x 15 cm, the other slightly larger (20 x 20 cm or more).

(2) Two rubber rollers of the kind used by etchers, and obtainable from dealers in artists' materials.

(3) A supply of paraffined paper, the heavier grade used in wrapping food.

(4) A tube of printers' ink.

(5) The pressure pad of "Spongtex" already described.

The paraffined paper should be cut in sheets slightly larger than the smaller glass plate (*e.g.*, 20 x 20 cm).

The process is as follows: Ink the smaller glass plate in the usual way by means of the roller—the optimum amount of ink is best determined by experience. Apply a sheet of paraffined paper to the inked plate as evenly as possible and squeegee thoroughly with the clean roller. Peel the paper from the glass and place it, inked side up, on the clean glass plate. Roll it carefully in all directions with the inked roller until the film of ink on the paper is evenly distributed. The paper will adhere to the roller, but this does not seriously endanger the result. Now place the inked paper on the pressure pad, inked side up. Bring the palm down on the inked surface with the fingers slightly spread and overhanging the pad beyond the middle of the proximal phalanges. Press the "heel" of your own hand down upon the dorsum of the subject's hand in the region directly over the hollow of his palm until you feel that contact with the ink has been uniform. Lift the subject's hand and peel off the inked paper. Place a sheet of clean (not paraffined) paper on the pad, bring the inked palm down upon it in the same position as before, and proceed exactly as in the inking process just described.

An inked sheet should be used but once, but a sufficient number may be prepared in advance for an entire day's operations; they will be found unsatisfactory if kept longer. With a little care a number of inked sheets can be carried about, thus avoiding the necessity of carrying plates and rollers and of re-inking a plate for each impression.[3]

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[2] In New York, A. H. Ivin Co., 331 Madison Avenue. Style No. 4 is recommended. It provides material for four slabs, *i.e.*, two pressure pads.

[3] It has been found preferable to ink the waxed paper directly with the roller rather than by squeegeeing it on an inked plate.

A slab of plate glass, having its shorter dimension at least 4 cm less than the length of the waxed paper, is prepared by affixing a strip of electrician's tape close to and parallel with each of the longer edges of the plate, on one surface only ("under surface"). The waxed paper is stretched across the upper surface of the plate and the ends turned underneath so that each end lies across a strip of tape. When the plate is laid on a table the ends of the paper will be held securely between the tape and the table so that the inked roller may be applied without causing it to slip.

A DEVICE FOR MEASURING SURFACE TENSION AUTOMATICALLY

THE measurements of the surface tension of colloidal solutions by means of the tensiometer must be made, either very rapidly, in case the dynamic value is sought, or else very slowly, and with great care, when the static value is required. We have shown indeed that the surface tension of such solutions decreased very rapidly as soon as the liquid was no longer stirred, but that also the rate of the drop decreased according to an exponential law. It is therefore necessary, when static measurements are made, to turn the knob controlling the torsion of the wire very smoothly and very slowly, increasing the pull at a rate of, say, twenty dynes per minute. In this way, the molecules disturbed by the deformation of the liquid surface have time to reorganize themselves in the surface layer. However, when taking such measurements, the "personal coefficient" of the experimenter plays an important part. In order to eliminate this cause of error entirely, Dr. Per Ekwall, of Åbo, Finland, fixed a clockwork on a tensiometer, and obtained excellent results; the clockwork was stopped by an electric contact operated by the lever supporting the ring.

We thought it might be better still to use a small electric motor, much less bulky than a clockwork, and

to simply have the lever cut the current as soon as the ring tore itself from the liquid. This device proved to be extremely satisfactory. The only thing to do now to obtain an excellent measurement is to press a button and take a reading.

The motor is connected to the knob through a double worm reducing gear, the ratio of which is 1/1.600. The vernier is driven at a rate which can be varied from twenty to forty dynes a minute. The motor stops almost instantaneously, by itself, on account of the considerable amount of friction, which may be increased by a small brake on the main shaft. The error introduced by the momentum of the armature amounts to about 0.02 dynes, always in the same direction, of course, and is therefore negligible. However, we have reduced it to zero by a simple and powerful brake which is automatically and electrically set as soon as the current is cut off.

LECOMTE DU NOÜY

INSTITUT PASTEUR, PARIS

SPECIAL ARTICLES

INTRANUCLEAR INCLUSIONS IN YELLOW FEVER[1]

TORRES[2] has recently described intranuclear inclusions in the liver cells of monkeys infected with the virus of yellow fever. He states that these inclusions are acidophilic and of "the same nature as those discovered in herpes simplex, symptomatic herpes, varicella and in virus III disease of the rabbit." The inclusions are, according to him, found in hepatic lesions like those described by Stokes, Bauer and Hudson[3] in West African yellow fever, which is interesting because apparently he himself investigated only the action of Brazilian viruses. His technique consists of staining with hematoxylin and eosin. He does not mention any particular fixative, but intimates that the inclusions may also be identified in frozen sections.

We wish briefly to report the discovery of intranuclear inclusions, which bear a striking resemblance to those of Torres, in the liver cells of eight *Macacus rhesus* monkeys infected with the West African virus of yellow fever. They also occur, though less abundantly, in the suprarenal gland. We confirm Torres in his contention that the inclusions are definitely associated with the specific lesions. In common with Torres, we have failed to find the inclusions in monkeys dying from causes other than yellow fever, or in normal control animals.

Morphologically the inclusions are made up of clusters, or colony-like clumps of particles. The particles themselves are very small in size, and though roughly spherical, are rather irregular in shape. Their contours are not smooth and evenly rounded. They are often contiguous but seldom confluent. The inclusions may be separated from the nuclear membrane by a layer of optically clear nucleoplasm, or they may be in contact with it. The affected nuclei, with their contained inclusions, pass through a series of changes which we hope to describe in detail subsequently. The large basophilic nucleolus remains intact until this process is far advanced. Side by side, or imbedded in these clumps of particles, we have detected in many cells a single, much larger, spherical, acidophilic mass, often limited by a distinct halo.

In regard to the staining reactions, we find, with Torres, that the inclusions are colored pink by eosin after application of the hematoxylin and eosin technique. The vestiges of basophilic chromatin remaining are stained blue. We have observed in addition, after preservation in Zenker's fluid, that the inclusions are colored pink by Giemsa's stain; but the best technique for their demonstration is to apply phloxin red and to counterstain with methylene blue, as in Mallory's method. The red coloration thus obtained is more brilliant and more specific than that secured with eosin. With these yellow fever inclusions, as in the case of those of chicken pox, herpes and virus III, the colors can be easily reversed. That is to say, they can be stained green instead of red, and the basophilic chromatin red in place of blue by using the well-known safranin-light green combination.

That the inclusions are present as such in the living animal and do not in any sense represent the coagulating action of the fixative is shown by the ease with which we have been able to study them in liver cells quickly removed from a chloroformed animal and examined in physiological salt solution. The addition of a supravital stain is not even necessary, since the refractive index of the individual particles is sufficiently different from that of the surrounding nuclear substance to render them easily visible with both direct and oblique illumination, when good lenses are employed; but they do not reflect or refract light to any great extent. Thus far we have not seen any trace of pigmentation. We have not used a polariscope. The particles become tinged when a trace of eosin is added to the salt solution, and are colored more intensely than any other elements in the cell when a little phloxin red is applied in the same way. In such supravital preparations they may be studied

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[2] *C. Rend. Soc. Biol.*, 1928, 99: 1344, 1655, 1660, 1669 and 1671.

[3] *Am. J. Trop. Med.*, 1928, 8: 103.