ferent cultural practices is brought out. It appears that this has not been considered by many of the cane growers who frequently fail to make profits because of this. The relation of soil types to each important crop of the country is discussed, special emphasis being placed on sugar cane, which is by far the most important crop of the island.

Dr. Curtis F. Marbut, of the Bureau of Chemistry and Soils, has contributed an interesting chapter on soil classification. This is followed by an appendix, tables, a glossary, a list of plant names, a rainfall map, a detailed soil map showing soil types and content of water soluble salts of an area on the south coast of Havana Province and an index. The illustrations are varied and well selected.

This volume is interesting throughout and should form a basis for future more detailed soil surveys in tropical areas.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

EXTRACTS OF FRUIT SKINS AS SELECTIVE NUCLEAR STAINS

THE skin of the blue grape—Concord or Worden—contains a pigment that stains nuclear chromatin very selectively. Five grams of the powdered dried skins, placed in ten cubic centimeters of water, heated to the boiling point and filtered, gives a dark purple solution. This stains the nuclei of tissues, celloidin or paraffin sections fixed in formalin or Zenker's fluid, or frozen sections either fixed in formalin or unfixed, a purplish color which becomes blue when the section is washed in tap water five minutes or longer. Eosin counterstaining can be used without altering the nuclear stain.

If one drop of a ten per cent. aqueous solution of ferric chloride is added to this aqueous solution of grape skins, the solution becomes blue and the sections are stained by it more deeply but must be decolorized with one per cent. hydrochloric acid alcohol (70 per cent.). If the sections are then washed with tap water the nuclei appear blue, resembling sections stained with methylene blue. However, the staining is sufficiently strong and selective with the simple aqueous extract followed by washing with tap water, so that the use of ferric chloride or other oxidizing or mordanting agents is not necessary or recommended.

The stain is taken up by the chromatin very selectively, and the differentiation is excellent. There is no tendency to overstain. The nuclei of rapidly growing cells, as in carcinoma, stain deeply, and mitotic figures are intensely blue. The stain is as effective when made from the fresh fruit skins, and a section of kidney stained in this way and exposed to diffuse light is now as blue as when prepared eight months ago. Even daily exposure to direct light in a south window for five months did not lead to any appreciable fading of the sections so stained. Evidently then this dye is of satisfactory permanence.

Blackberries, black raspberries, blueberries, huckleberries, the skins of black figs, large purple plums, small purple plums, dark red plums and blue plums, and black sweet cherries, have all been found to contain pigment which may be extracted in usable condition by merely boiling with water. The coloring matter thus obtained has a marked and selective affinity for the chromatin of tissue cell nuclei. If the fruit skins contain much acid, as in the case of the plums, the staining is red, but when washed in tap water the nuclei become blue, and unless the section has been stained for a long time, ten or twelve hours, for instance, only the nuclei retain the stain. The juice expressed from the black raspberries and blackberries before heating also stains nuclear chromatin readily. Blueberries have a tougher skin and have to be boiled to obtain results that are satisfactory, and the extract thus secured is apparently the most active of any of these fruits.

For large-scale production, grape skins offer an economical source. Grape juice, as on the market for beverage purposes, does not contain enough of the coloring matter to be used for staining. An extract made by boiling ten grams of the dried grape skins for one hour in one hundred cubic centimeters of 50 per cent. alcohol was very satisfactory. It stained no better than an aqueous extract of the same strength, but it has keeping properties that make it preferable.

Such a simple, inexpensive and universally available staining material would seem to have possibilities. It demands no complex method of preparation and mordanting. No aging is required, as with hematoxylin, and the stain can be used at once. It seems to be fully as selective as hematoxylin, is much less expensive and apparently is very permanent as far as yet determined.

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A MICRO-GUILLOTINE

THE instrument described here was designed primarily to effect at any desired place and with a high degree of precision the breaking of the tip of a micropipette made by the method described at various times by Chambers.[1] It has been found in practice that

[1] Chambers, Robert, *Anat. Rec.*, Vol. 24, No. 1, 1922.

the method of breaking by bringing the tip up against the coverslide (Chambers)[1] frequently results in faulty micro-pipettes, thus causing a considerable loss of time.

The device consists of a frame made of a strip of brass with a thin groove milled out along its center and folded to form a square with the groove inside.

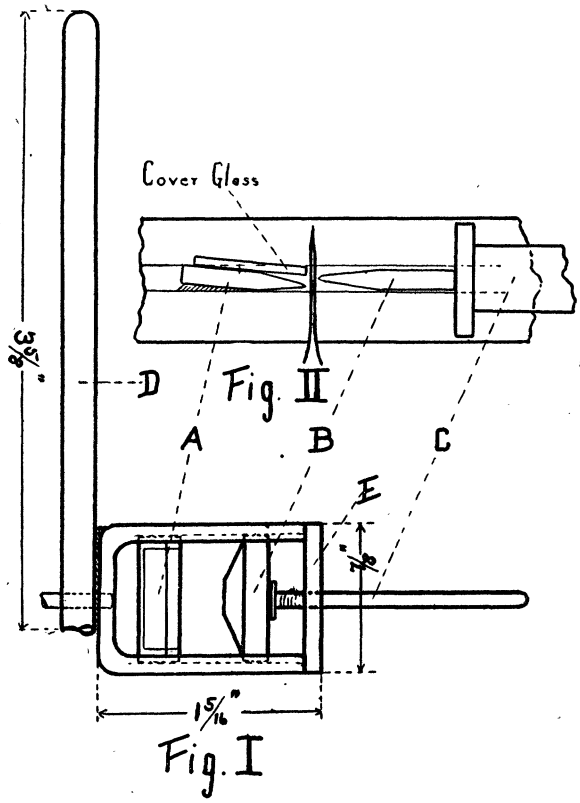

Fig. II

Fig. I

Into this groove are fitted (A) a piece of Gillette safety razor blade and (B) another piece of blade, cut to form a rough wedge front and attached to a holder (C) (in this case an ordinary wire nail) by which it may be drawn back and forth. On top of blade A is a thin piece of cover-glass so placed as to leave a space between it and the blade, just wide enough for the edge of blade B to enter (see Fig. 2). The edges of this cover-glass and blade A which face blade B must be accurately lined up, one above the other. The entire frame is soldered to a rod as indicated.

In operating, the guillotine is supported by the rod in one of the holders of the micrurgical machine under the microscope and the pipette introduced between the blades. The guillotine and the pipette are then approximated to each other until the pipette rests against blade A at the place where the break is to be made. Blade B is then pushed in gently, but firmly against the pipette and the break is made (*cf.* Fig. 2). The blades must be scrupulously clean or the pipette may clog. If greater delicacy in manipulating blade B is desired, the sliding holder to which it is attached may be changed for a screw and a hole may be tapped in cross-bar E to receive it.

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SPECIAL ARTICLES

RESULTS SECURED BY APPLYING THE FEULGEN REACTION TO FIBROBLASTS AND SARCOMATOUS CELLS IN TISSUE CULTURES

WHEN a cell once becomes cancerous the change in it is inherited and transmitted to all its descendants within the afflicted person. This persistence of malignancy has led investigators to suspect that the nucleus is profoundly modified; but no constant microscopically visible deviation from the normal has yet been demonstrated. With the idea of again attacking this problem Dr. Alexis Carrel very kindly gave me a series of tissue cultures of normal fibroblasts and of sarcomata and to them I have applied the reaction recently introduced by Feulgen[1] for the demonstration of thymonucleic acid in the hope that thereby some slight difference associated with malignancy might be brought to light.

The reaction depends upon the formation of a relatively insoluble dark purple compound in regions of the nucleus containing thymonucleic acid. The distribution of the reacting material is very restricted. It does not occur, for example, in either the Nissl bodies of nerve cells or the chromidial substance of gland cells, although both of these materials stain like nuclear chromatin with basic dyes, and like it also contain detectable amounts of masked iron. The exact technique employed is described elsewhere.[2]

Special precautions were observed in order to make the comparison between the normal and malignant cells as close as possible. In the cultures the normal fibroblasts and sarcomatous cells were planted side by side in the same flasks. After their rate of growth had been determined they were fixed simultaneously by flooding the flask with a mixture consisting of equal parts of absolute alcohol and saturated aqueous corrosive sublimate. The layer of coagulated plasma covering the bottom of the flask and containing both groups of cells was then removed and its edges cut

[1] Krause, R., *Enzyk. f. mikr. tech.*, 1927, Vol. 3, pp. 1729–1732.

[2] Cowdry, E. V., SCIENCE, 1928.