In the single study of Schlutz completed to date the tables showed, first, that the nitrogen metabolism during camphor administration was well within the normal, both before and after duodenal obstruction; second, that the glycuronic camphor pairing decreased from 41 to 27 before and after obstruction. This may indicate that the liver function had been impaired.

SUMMARY OF RESULTS

1. Epithelial cells of jejunum and ileum given by mouth to duodenally obstructed dogs prolonged life in a series of fifteen animals by about thirty-six hours over a similar series to which they were not given.
2. The average pulse-rate of the treated dogs was thirty-three beats lower than that of the untreated.
3. The belief that we were dealing with a cytologic product was strengthened by the trend of the charts. These showed that beneficial action occurred early, just as in the case of any successful treatment by antibodies.
4. The chemical determinations in one animal showed a normal nitrogen metabolism after duodenal obstruction and suggested a decreased functional power of the liver in terms of glycuronic camphor.
5. This series is far too small to justify any positive conclusions. Its value is simply that of a suggestive working basis.

THE USE OF CALCIUM CARBONATE IN SOLID MEDIA FOR THE DIFFERENTIATION OF SUGAR-FERMENTING BACTERIA

ESPECIALLY OF THE COLON-TYPHOID GROUP*

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Media containing lactose with litmus as an indicator for acidity have been extensively used for growing the

Fig. 1.—Culture of the colon bacillus, showing the clear area about each colony, where the chalk has been dissolved by the acid.

colon bacillus and differentiating it from closely allied organisms. This type of medium is well exemplified in Wurtz's lactose litmus-agar which consists of a 1 per

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cent. lactose-agar colored with litmus. These media have several defects, chiefly due to the rapid diffusion of the acid, causing a general reddening of the adjacent medium. This necessitates having plates with few colonies and examining and counting while the colonies are still small. Also gas formation often occurs, ruining the plate.

To overcome these disadvantages, media consisting of stiffer agar have been devised, on which surface smears are made. This is the type of the Conradi-

Fig. 2.—Mixed culture of the colon and typhoid bacilli. About each colon colony there is a clear, translucent zone, appearing as a black zone in photograph on account of plate being placed against a black background. This transparent zone is absent about the typhoid colonies.

Drigalski medium, which consists of a special nutrient 3 per cent. agar, to which crystal violet is added as an inhibitor for less resistant organisms than the typhoid bacillus.

With the intention of limiting the diffusion of the acid formed by the splitting of the lactose, I began to experiment by adding various alkalis to the medium. But such alkalis as NaOH and NaCO₃ when added in sufficient quantities had a deleterious effect on many of the organisms, and besides colored the medium an intense blue, which completely masked the production of alkalies, which production is of value in identifying typhoid colonies and those of the organisms of putrefaction.

A neutral agar was desired in which the acid produced by the fermentation of the sugar would be neutralized in order to prevent its diffusion. This result can best be obtained by using an insoluble alkali or alkaline salt.

The simplest and most efficient of the insoluble alkalis seems to be calcium carbonate—precipitated chalk. Being an impalpable powder, it is readily distributed throughout the medium, it exerts no inhibition on the organisms, is readily obtainable everywhere, and is inexpensive. Furthermore, the chalk in combining with the acid is dissolved; hence acid-forming colonies are surrounded by a clear zone. This clearing of the medium is a valuable aid in recognizing acid-forming colonies.

The medium consists of:

	Gm. or c.c.
Agar	15
Liebig's extract	5
Salt	5
Peptone	10
Lactose	20
Calcium carbonate	4
Litmus solution	100
Water	1,000

The agar, Liebig's extract, salt, and peptone are dissolved in one liter of water either in the autoclave or over the free flame. This is then cleared with the whites of two eggs and filtered through cotton. No titration or adjustment of reaction is necessary. The medium should then be flaked, 250 c.c. to a flask preferably of 500 c.c. size. One gm. of powdered calcium carbonate is then added to each flask, and the whole sterilized in the autoclave. Finally to each flask is added 25 c.c. of Kahlbaum's aqueous litmus—according to Kubel and Thieman—(or an equal quantity of a solution of azolithmine); and 5 gm. of chemically pure lactose. Tube by pouring direct from flasks to tubes, keeping contents

2. Reddening of the colony due to the litmus.
3. Microscopically by the deposition of crystals of the calcium salts of the organic acids.

Differentiation between colon and typhoid colonies on this medium is readily made.

COLON COLONIES

1. *Surface*.—These are large disk-shaped colonies, slightly depressed in the media. There is a variable amount of clearing about them due to the solution of the chalk. The extent of clearing depends on the length of time the plates are incubated. Microscopically on focusing up and down, the chalk is seen to be dissolved just below the colony and about its periphery. Crystals of the calcium organic acid salts are usually seen.
2. *Deep*.—These are rounded or spindle-shaped, showing a very distinct clearing of the chalk for a considerable area about the colony.

TYPHOID COLONIES

1. *Surface*.—These are large white or bluish-tinged colonies showing no clearing of the chalk. Microscopically the amorphous granules of the chalk are seen to be both within and about the colony. No crystals of the organic salts are present.
2. *Deep*.—These are distinct colonies lying embedded in the chalk without solution of the chalk occurring.

Fig. 3.—Deep colon colony, showing clear area.

Fig. 4.—Deep typhoid colony.

well mixed. Sterilize in an Arnold sterilizer for fifteen minutes on three consecutive days.

In using this medium either surface smears may be made on plates or the tubes inoculated and poured. For most uses the poured plates give best results. To obtain a uniform distribution of the chalk throughout the medium, the tubes should be rolled rapidly to and fro between the palms of one's hands, and then by alternately depressing and raising the plugged end of the tube combining this with a rotary motion. This mixing should be done as soon as tubes are melted and while still hot. They are then cooled to 42 C. They may then be inoculated and poured.

Inoculated plates may be incubated fourteen to forty-eight hours at 37 C., or from two to five days at room temperature. Usually eighteen to twenty-four hours at 37 C. gives best results.

Acid production in this medium is shown by:

1. Dissolving of the chalk about the colony due to its combination with the organic acids.

For isolating the typhoid bacillus from feces, sewage, or contaminated water, 1 per cent. lactose and 1 per cent. saccharose may with advantage be substituted for the 2 per cent. lactose. Plates should be incubated fourteen to twenty hours at 37 C. Suspected typhoid colonies should be fished and inoculated into Hiss tube media or other suitable media for identification. I have on several tests isolated typhoid bacilli direct from the feces without enrichment.

The advantages of this medium are:

1. Neutralization of the acid as it is produced.
 - A. Crowded or well-diluted plates may be used with equal advantage.
 - B. The period of incubation is not limited.
 - C. Gas formation is greatly lessened, probably owing to the neutralization of the acid as soon as it is produced, thereby preventing it from being further broken down.
 - D. Acid formation is more clearly shown and its extent may be gauged.

2. Simplicity of the medium:

- A. Stock meat extract agar may be used by simply adding chalk, lactose, and litmus.
B. The medium is neutral in reaction without titration or adjustment. The acidity of the meat extract is neutralized by the chalk, giving a neutral agar on which slight alkalinity or acidity is readily shown.

This type of medium may be used in growing and identifying any organism in which the fermentation of any sugar is the basis of its differentiation. For some organisms such as the pneumococcus and streptococcus, meat infusion agar may be substituted for the meat extract agar. Any of the sugars may be used instead of the lactose. The percentage of sugar may be varied from 1 to 5 per cent.

In conclusion I desire to acknowledge my indebtedness to Prof. P. H. Hiss for many valuable suggestions, and to Mr. Bosse for the accompanying photographs.

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PINNING FRACTURES THROUGH A CAN- NULA WITH THE AID OF THE FLUOROSCOPIC SCREEN*

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Last year I had occasion to remove a pin from a bronchus with a pair of alligator forceps inserted through the trachea. The fluoroscopic screen was employed for watching the movement of the forceps within the chest cavity. An account of this procedure was published in *Surgery, Gynecology and Obstetrics*, May, 1910.

It occurred to me at the time that if pins could be removed so easily with the aid of the fluoroscopic screen a reversal of the process might allow pins to be put in with facility in certain fractured bones which are not readily kept in place with splints.

At the present time I am engaged in experimental work along this line of observation, and publish a preliminary note on the subject quite as much for the purpose of pointing out difficulties in some cases, as in showing how this resource facilitates our work in other cases. We are now enabled to avoid open operation in certain cases in which open operation is otherwise indicated, and we can hold the ends of fractured bones in position in some annoying cases in which open operation would not be quite justifiable.

The work can be done in large part with such instruments as most surgeons have at hand, but it has seemed best to make up a case of instruments particularly adapted for the new work. A special table also was constructed with various slides, so that any part of the anesthetized patient could be conveniently exposed to the x-ray in front of the fluoroscopic screen. Dr. L. Kast made the first helpful suggestions in ways for using the fluoroscope for this work, and Dr. Howard T. Lewis, under the direction of Dr. F. H. Albee, has assisted in much of my work and in planning conveniences.

In fractures of the smaller bones the fluoroscopic part of an ordinary fluoroscope can be detached and used to better advantage than the large screen.

* Read in the Section on Surgery of the American Medical Association, at the Sixty-Second Annual Session, held at Los Angeles, June, 1911.

The instruments consist of trocars and cannulas, which are inserted obliquely to points of fractures; bone-drills for cutting channels for dowel-pins; tampers for pressing dowel-pins into place; an alligator forceps for removing badly placed dowel-pins; and segments of silver or German-silver wire of different diameters, to be cut up into requisite lengths with the file for dowel-pins.

When a dowel-pin is to be inserted the patient is anesthetized. Up to the present time I have depended on general anesthesia, but shall use local anesthesia in selected cases after a little more experience.

The steps in order are as follows:

1. A proper area of skin is sterilized.
2. The fluoroscopic screen is held in a convenient position for observing the site of fracture.
3. One or more assistants make traction and manipulate fragments until they are seen to be in position.

Fig. 1.—Three instruments of the special set (Kny-Scheerer Company, New York): (1) cannula and trocar with short point; (2) drill to fit snugly into the cannula and to project beyond its lumen; (3) tamper for pressing dowel-pins into place.

Fig. 2.—An accident to be avoided. Fragments were held accurately in position and pin appeared to be entered properly. This radiograph, taken next day, showed fragments out of position.

4. A trocar and cannula are inserted through the skin, and carried obliquely to a chosen point near the site of fracture.

5. The trocar is removed, leaving the cannula in position.

6. A drill is passed through the cannula, and transfixes both fragments which are to be pinned.

7. The drill is removed, and a dowel-pin of suitable length dropped into the cannula.

8. The pin is pressed into place in the drill holes with the aid of a tamper.

9. The cannula is removed, and a trifling dressing applied over the skin puncture.

10. Customary splints are applied to relieve stress on the dowel-pin.