tation of uric acid by acids, and at the same time of causing precipitation of urea by hydrochloric acid.

The most important of the conclusions reached by Mr. Gordon from his numerous experiments and observations are:

1. The main sources of error in testing urine for sugar will come from the continued administration of many of the synthetics at short intervals in the usual doses; single or widely separated doses of most of these have little effect, as the dilution is too great in the urine.

2. By allowing sufficient time for the drugs to be eliminated from the system, usually only a few hours when not taken long enough to saturate the system, the error their presence in the urine causes can be reduced to a minimum. In cases of doubtful sugar reactions, stop the treatment for at least twenty-four hours before collecting samples of urine.

3. When drugs have been administered for some time, the morning urine will contain the greatest amount of their derivatives.

RECAPITULATION.

To recapitulate briefly the more important points made in this paper:

1. The most convenient preliminary test to apply for sugar in the urine is picric acid, which gives in two minutes a quantitative determination which requires no elaborate apparatus and is generally approximately correct, subject to confirmation by other tests.

2. Of the newer reduction tests, methylene blue is perhaps the only one that will especially interest the physician, and is an exceedingly sensitive test.

3. The copper test yields to none in sensitiveness, and, although more open to fallacies than the bismuth test, need not be abandoned altogether by those who have learned to use it.

4. The phenylhydrazin test is easily made, is more nearly conclusive than any other chemical test, and should always be applied in confirmation of the conclusions drawn from other tests. In inexperienced hands it may fail to reveal sugar when present in a proportion of less than one-half of 1 per cent.

5. When small quantities of sugar are to be determined quantitatively by means of a volumetric copper solution, creatinin should first be removed from the urine by the method of G. Stillingfleet Johnson.

6. By aid of a suitable apparatus, quantitative determination of sugar can be made by fermentation even when the proportion is quite low. The ordinary fermentation saccharometers can not, however, accomplish this, their quantitative results being almost of no value.

I have made no mention of the use of the polariscope, which in its improved form is of great value, particularly where the physician wishes to make daily examinations of the urine of a patient. The instruments are so costly that they seldom form a part of the equipment of a physician's laboratory.

DISCUSSION.

DR. HEINRICH STERN, New York—I think Dr. Lyons laid too much stress on the phenylhydrazin test. In my estimation this is a much overrated test. I have employed the various modifications of the test, those devised by Jaksch, Jolles, Ultzmann and Havelburg. Normal urine treated with phenylhydrazin may occasionally yield crystals which to all appearances are identical to those of phenylglucosazone. The outside appearance of the crystals is no positive proof of their true character. If the phenylhydrazin test is to be depended on, the melting point of the crystals must be determined. Glycuronic and oxalic acids, carbamid, pentoses, etc., combine with phenylhydrazin. The phenylsazone crystals of glycuronic acid or its combinations are exactly analogous to those of phenylglucosazone. The melting point of the glycuronic acid compound is

between 114 and 115 C., that of phenylglucosazone in its impure state between 173 and 194, and when pure between 204 and 205 C. The fermentation apparatus exhibited by Dr. Lyons is undoubtedly an improvement over Einhorn's and similar apparatus, as it prevents absorption of carbon dioxide. I am, however, of the opinion that my fermentation apparatus, the urino-glucosometer, possesses advantages over all the other urine fermentation devices. That apparatus is based on the method originally brought forward by Roberts. The apparatus can also be utilized for ascertaining the specific gravity of the urine. The great difference between this and all other fermentation apparatus is that with the aid of the Stern device the amount of urinary glucose may be definitely determined while the other apparatus, at their best, only permit an estimation of the amount of grape-sugar contained in the urine. By placing my apparatus or the specially-designed fermentation tubes into a sandbath or into an incubator in which the temperature is kept at a constant temperature of from 34 to 38 C. complete fermentation of the contents of the tubes may be obtained in from 6 to 8 hours.

DR. A. B. LYONS, Detroit—My paper referred to glycuronic acid and its liability to interfere with the phenylhydrazin test, but I omitted that part in condensing my remarks. I particularly insisted, however, that the phenylhydrazin test must be supported by others, and especially by the fermentation test. There is one other test that I had intended to mention, although I have had no personal experience with it—in fact, I have not been able to procure the reagent, although I sent to a prominent dealer in chemicals in New York for it. The reagent has a polysyllabic name, ortho-nitrophenyl propionic acid, called for short nitropropiol. It is now to be had under the latter name in the form of tablets for use in urine testing. The presence of glucose is indicated by it by the development of a blue color, which is best made evident by adding a little chloroform, which is colored blue by it. The test is said to be a delicate one. Glycuronic acid also produces the blue color, so that the indication of this test also should be confirmed by fermentation.

THE PRESENT AND FUTURE THERAPY OF ORTHOPEDIC SURGERY.*

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The development of orthopedic surgery, as a specialty, has been attended by some incidents and circumstances which I think invite especial comment, for, more perhaps than any other specialty in medicine, its evolution has been influenced by a few men whose personality and whose acknowledged ability, especially in a mechanical way, have contributed to the present successful status. The influence of these pioneers, supplemented by the modern developments of operative surgery, has been to establish in the minds of many some doubt as to what orthopedic surgery really is.

Modern orthopedic surgery in this country may be said to date from the time of Dr. Henry J. Bigelow of Boston, who wrote a "Manual of Orthopedic Surgery," which obtained the Boylston prize for 1844. The essay was on this subject: "In what cases, and to what extent, is the division of muscles, tendons and others parts, proper for the relief of deformity or lameness?" The works of Guerin, Bonnet, Velpau, Phillips, Duval, Little and others were utilized by Bigelow in his essay, and he incorporates strabismus and stammering in his work, with club-foot, torticollis, ankylosis of the knee, flexion of the hip-joint, lateral curvature of the spine, contracted hands and fingers, congenital dislocation, re-

* Read before the American Therapeutic Association, in New York City.

cent and chronic dislocations and locked jaw. This is submitted with a preface, a part of which reads as follows: "It is believed that the general intention of the committee will be fulfilled by an attempt to cover the ground now occupied by orthopedic surgery."

It will be noticed that no mention is made in this essay of Pott's disease of the spine, hip-joint disease or of any other of the deformities due to chronic or progressive diseases of the articulations, all of which may result in deformity or lameness. Nor was it until 1855 that these diseases and deformities of the joints attracted especial attention. At that time Dr. Henry G. Davis introduced his famous traction splint for the treatment of hip-joint disease and his equally efficient antero-posterior support for Pott's disease of the spine, and the pathologic conditions underlying these diseases began to be appreciated if they were not fully understood, although Dr. Davis distinctly stated that they were tuberculous. Davis' apparatus was quickly adopted, amplified and improved by his contemporaries, and Bauer, Taylor, Sayre and Knight soon after, by their strong personalities and marked abilities, established what has since become known as "The American School of Orthopedic Surgery."

Thus it is that the subcutaneous tenotomy of Stromeyer (1830), supplemented by Little of London, Detmold of New York, and others in the same field, and the later efforts and successes of the pioneer American orthopedic surgeons, made a legitimate school of orthopedic surgery which has been augmented and amplified by numerous eminent men, whose work has been greatly to the credit of medicine and surgery.

In the meantime an important advance in the treatment of deformities occurred with the introduction of osteotomy and osteoclasts and the plaster-of-paris bandage. The treatment of knock-knee, bow-leg and other osseous deformities were thus brought under the classification of acute fractures; in short, under the care of the general surgeon, who became independent of the orthopedic surgeon and the use of specially constructed apparatus in the treatment of these conditions. The application of the gypsum bandage was taught in the medical colleges as much so as other conventional splints, and the general surgeon found himself equipped to do much work that formerly fell to the orthopedic surgeon. Orthopedic surgery, therefore, found itself confronted by a serious question, a question I tried to solve in an address¹ before the orthopedic section of the Berlin International Congress in 1890, in which I said: "There would be no true orthopedic surgery to-day if mechanico-therapeutics had not been studied long and patiently by a comparatively small body of intelligent surgeons." This statement is just as true to-day as it was twelve years ago, and it revives the question as to what really constitutes orthopedic surgery, and what should be its future status as a specialty, especially from a therapeutic standpoint.

For the purpose of discussing the future therapy of orthopedic surgery let us dismiss from our minds the various non-inflammatory long-bone deformities, such as knock-knee, bow-leg, etc., which however much the orthopedist may claim them, will be operated on and successfully treated by the general surgeon. They are conditions with which, after a certain age, the general surgeon can easily cope and their future therapy is not so liable to undergo marked changes as that for other deformities to be considered later. A considerable num-

ber of these long-bone deformities, however, will always be treated by mechanical means, and the operative measures for these deformities are not gaining in popularity.

In an address² before the Board of Trustees of the New York Orthopedic Dispensary and Hospital, delivered in 1897, I made the following assertion: "It will be along the line of conservatism that orthopedic surgery will be developed, not on the lines of operative surgery."

Let us study this aspect of the subject and see where it leads. As a fundamental principle let us quote as general propositions the following:²

1. "The treatment of chronic deformities would be emasculated if mechanical treatment was omitted. Indeed, under these circumstances there would be only operative surgery left."

2. "The operative part of orthopedic surgery becomes the simple but necessary adjunct of the mechanical work."

These simple propositions underly, I think, the present and future therapy of orthopedic surgery.

No one who is familiar with the present mechanical aids of the orthopedic surgeon can avoid the conclusion that they are still in their infancy. The apparatus now in use will be thought very inefficient by the orthopedic surgeon fifty or one hundred years hence. So also with many of our present methods. They will all be revised, amplified and improved or perhaps discarded for others, based on a clearer conception of the various conditions involved. The therapy of the orthopedic surgery of the present day represents an undeveloped, but necessary, specialty. It represents, especially from a mechanical standpoint, inspiration, rather than the result of study and research. It represents the clinician rather than the pathologist. It represents intuition rather than inductive reasoning. Davis struck an important principle when he imitated Nature and made an apparatus do what the human hand, guided by the human intellect, accomplished. Taylor, a born mechanician, would sit down, scissors in hand, and cut out a pasteboard pattern of an apparatus for club-foot. Sayre could apply with his deft hands a gypsum splint in a way that I have never seen equaled. Knight would intuitively devise apparatus for a given deformity and make a creditable drawing of it at a moment's notice. In stating these characteristics of these honored men I have no thought of detracting from their other eminent and recognized abilities. Still, I never knew any of these pioneers in orthopedic surgery to work out a problem in the application of artificial mechanics to a human deformity on what might be called a scientific basis. It seems foreign to their nature, and perhaps to their training, to imagine any one of these men defining a deformity with a scientific formula, such, for instance, as is used by the ophthalmologists of the present day. But this scientific method must come before orthopedic surgery can claim a safe position among the specialties of surgery, and this method will be used to describe certain deformities, not only for permanent record, but to meet the intelligent comprehension of the profession.

No one doubts the potent influence of these men in founding a distinct branch of surgical inquiry; and no one can take exception to their abilities or to their well-earned renown. They have given us a point of common interest around which we may all gather, and they have pointed out the way to grand results. But the problems they have left unsolved only stimulate inves-

1. What Is Orthopedic Surgery? Transactions of the Tenth International Congress, 1890.

2. The Operative Side of Orthopedic Surgery. N. Y. Medical Record, Dec. 18, 1897.

tigation and study among their humble followers, and it seems almost useless to say that these investigations and studies will not be so much with the knife, chisel and saw, as in the almost unexplored fields of mechanical therapy, and in pathologic exploration.

The future therapy of orthopedic surgery must answer, among many other unsolved problems, the following, viz.: a more scientific way to make traction in hip-joint disease; the successful relief and cure of lateral curvature of the spine; the prevention of deformity in Pott's disease, especially in the dreaded respiratory region; the prevention of deformity in hip-joint disease; the radical and permanent cure of congenital dislocation of the hip; the relief of many of the urgent deformities of infantile spinal and cerebral paralysis; the permanent and speedy cure of flat-foot and allied conditions, and the relief and cure of many deformities dependent on tuberculosis, now only exceptionally successfully treated. The future development of orthopedic surgery opens up a wide field that scarcely invades operative surgery. It invites the physiologist, the pathologist, the surgeon and the mechanic alike, and the successful orthopedic surgeon of the future must combine all these.

At present the foundations are laid—that is all. The same principles which have guided the minds which have made the Brooklyn bridge an everyday conventional affair, will guide the minds which conquer the unsolved problems of orthopedic surgery. No one man will do it. A syndicate of far-apart thinkers, earnestly working for the same end, perhaps by diverse methods and from totally different standpoints, will ultimately formulate means of relief and cure which now seem unattainable.

Looking at the therapy of orthopedic surgery to-day, one must be impressed with the tendency which exists to cultivate the surgical at the expense of the mechanical. The eagerness of the medical student to witness the bloody and difficult operations in the amphitheater, while he neglects the equally necessary mechanical details of the orthopedic department of college work, is reflected in the profession at large. This applies to some who are best known as orthopedic surgeons. They will operate with skill and interest in a given case of deformity not, perhaps, really requiring operative work, only, when the operation is completed, to turn their patient over to an uneducated mechanic in steel for much of the subsequent treatment. On the other hand, it is not uncommon to find a complicated apparatus, useful enough in the hands of a skilled surgeon, but utterly useless in the hands of the inexperienced, pictured in the numerous catalogues of instrument-making firms, which are so freely circulated among the profession. Since the introduction of the plaster-of-paris bandage, the profession have been less dependent on this class of men, but only because the use of plaster of paris has been taught in the medical colleges. But to the skilled orthopedic surgeon the plaster-of-paris bandage in many instances will always be a "ready-made clothing" affair, for he will prefer, in nearly every case, to adjust and adapt an apparatus, based on scientific principles, which meets the indications and which can be adjusted even in minor particulars to meet the requirements of the condition under treatment. In short, he will make his apparatus a veritable prescription which can be modified by his own hands, and he will discard, as far as he can, all fixed forms of apparatus, of which the gypsum splint is a typical example. Those who thus make themselves personally responsible for

the mechanical therapy of their patients are perhaps not numerous in the profession to-day. But those who have followed this method have probably saved orthopedic surgery as a distinct specialty from being absorbed by general surgery.

In order to bring the future therapy of orthopedic surgery up to a proper standpoint the medical colleges throughout the world should be equipped with a completely appointed mechanical laboratory where the students will come in contact with the various deforming diseases of childhood, and be taught in a practical way the mechanics of the human frame and the application of artificial mechanical means to relieve and cure deformity, especially of the parts involved in locomotion. Writing on this subject in 1898, I say:³ "The next progressive step in the surgical care of deformities will be to establish a mechanical laboratory where the practical use of apparatus in the treatment of deformities may be intelligently taught in all our medical colleges."

This, it seems to me, is the most important step in the future therapy of orthopedic surgery. The student having been made familiar with the important first principles of mechanico-therapy, and educated in the essential details of the application of the ordinary forms of apparatus, the importance of mechanical therapy will be recognized, and much that is now left to the imagination of the student will be clearly defined. And this means that orthopedic surgeons who accept appointments in college work should be masters of a subject that is now quite neglected.

My plea, therefore, is for an advanced therapy for orthopedic surgery which will place it where it will be a true specialty, quite apart from general surgery, where those who practice it will bring to bear on its many interesting problems a close study of its pathologic bearings, a clearer conception of its surgical necessities and a recognition of the extreme value of a close study and a more scientific development of its mechanical side.

We have no school of applied mechanics in our medical colleges. We can demonstrate the surgical (operative) measures. We can illustrate symptoms and diagnosis, in the clinics and in the sectional teaching, but we can not give the practical instruction which is necessary in mechanico-therapy without a well-equipped laboratory; in short, a shop supplied with power and tools and controlled by a master at the head of it all.

When I read my essay on "What Is Orthopedic Surgery" before the Berlin Medical Congress in 1890, I attempted to define orthopedic surgery as follows:

"Orthopedic surgery is that department of surgery which includes the prevention, the mechanical treatment, and the operative treatment of chronic or progressive deformities, for the proper treatment of which special forms of apparatus or special mechanical dressings are necessary."

I can see no reason for changing this definition. Any surgeon fully mastering the conditions laid down in this definition will find his hands fully occupied and his heart and brain interestingly engaged in a work that will meet with ample reward, and which needs no other approval than that of his own conscience.

3. On the Care of Crippled and Deformed Children. N. Y. Medical Journal, July 9, 1898.

Amyloform as a Specific Against Coryza.—The personal and clinical experience of H. Lepa, as detailed in *Med. Blätter*, No. 5, establishes that the harmless powder, amyloform, will arrest a cold in the head in its early stages and relieve it at any stage. He combines it with equal parts of rice starch and uses it freely as a snuff every hour or oftener.