ligatures are passed around the artery, the distal one being applied as far peripheral as possible and tied, the proximal left loose. A vein of fair size in the recipient is similarly exposed (in infants the femoral must be used), and the ligatures passed, the distal one again being tied. On both artery and vein a *serre-fine* is applied proximal to the loose ligature in order to stop the circulation temporarily.

The link is emptied of the paraffin oil and placed in salt solution to be ready for use. The artery is pulled out of the wound by means of the ligature and with a snip of the scissors a small transverse slit is made into its lumen. The edges of the slit are grasped on either side with two fine eye forceps and drawn apart. Through this aperture the one end of the cuffed link is introduced toward the heart (the handle of the cannula being steadied with an artery forceps) and the loose ligature tied in the first groove of the cannula. The vein is treated similarly, the opposite end of the link being inserted toward the heart, and the ligature tied. (It is well to make the slit in the vein near the distal angle of the skin wound in order to have a portion of the vein visible and palpable, as this enables the operator to see and feel the pulsation and thus control the transfusion, or at once to recognize a stoppage of the flow.) The *serre-fines* are now removed, the one on the vein first, and the exchange of blood allowed to proceed (Fig. 4). Throughout the manipulation both wounds should be kept well moistened with salt solution. During the transfusion the link should be supported by a gauze sponge saturated in salt solution and covered by another moist compress.

When enough blood has been obtained both artery and vein are tied off, the small injured part of the vessels being excised. The skin wound is then closed.

This technic closely resembles that so familiar in intravenous saline infusion, the infusion cannula being represented by the cuffed link. Should the opening in the artery prove too small, a very fine blunt artery forceps or scissors may be inserted closed, and then opened in order to stretch the lumen.

For adults, carotids obtained from medium-sized dogs should prove the proper size, as they are easily cuffed on the large or medium Crile tube. If a smaller cannula is desired, a cat's carotid is available, though of course much shorter in length. The stretched dog's vessel is three and one-half to four inches in length, the cat's half that. The hypothesis that clotting is due to an alien blood vessel has been disproved by the work of numerous investigators. We also have used rabbits' and cats' vessels on dogs with complete success.

TESTS OF THE STERILITY OF PREPARED LINKS

A series of links were prepared, without aseptic precautions and immersed for two to eight hours in 2 per cent. and 4 per cent. formalin. This entire series proved sterile. A similar series of links were infected with the spore-bearing *Bacillus anthracoides*, incubated for forty-eight hours, immersed for one to thirty-six hours in 2 per cent. formalin and then tested after thorough removal of the formalin. No growth took place in the tubes subjected to formalin for more than ten hours. Numerous control experiments showed abundant growth.

SUMMARY

1. The links are prepared by cuffing dog's carotids at both ends over Crile's tubes, stretching them on a wire frame and fixing them for twenty-four hours in

2 per cent formalin. The formalin is removed by two changes of sterile salt solution (thirty to sixty minutes each), and the links permanently preserved in sterile paraffin oil.

2. Of twenty-six transfusions performed by means of prepared links, but one failed (owing to kinking of the vessel during its preservation).

3. The method of preservation kills bacteria, including spore-bearers.

4. The technic if transfusion corresponds closely to that used in intravenous saline infusions.

As far as can be predicted, the use of the prepared links affords a simpler and easier method than those hitherto described, and it is hoped that it will soon receive trial on the human subject.⁸

In conclusion we desire to express our obligations to Dr. T. Mitchell Prudden for extending to us the courtesies of the laboratory, to Dr. Carrel for his kindness in permitting us to use his method of preparing vessels before he had published it, to Dr. H. Zinzer for supplying us with test cultures, and to Dr. Simons for assistance in the bacteriologic tests.

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THE INCUNABULA IN THE SENN COLLECTION AT THE JOHN CRERAR LIBRARY *

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The most interesting part of the Senn collection is undoubtedly the library of Professor Wilhelm Baum, of Göttingen, which Dr. Senn purchased at auction in 1885. Professor Baum was one of the most learned surgeons of his time and exercised a wide influence on succeeding generations of students and physicians, both as a teacher and practical surgeon, although he wrote practically nothing after receiving his degree in 1822. From 1829 to 1842 he was the head of the city hospital in Dantzig, and from 1842 to 1875 held positions as professor of surgery, first at Greifswald, afterward at Göttingen. After his retirement in 1875 he spent his leisure in collecting material for a history of surgery, though he never came so far as to write any part of it. Dr. Baum was a book collector all his life, and he placed his library most generously at the disposal of other students; it is a working scholar's library, not a bibliophile's; there are no tall copies in it, no books printed

8. Through the kindness of Dr. A. V. Moschcowitz we have recently had the opportunity of performing a transfusion on a human being by our method. Technically the operation was as simple as when performed on animals. The blood ran freely for six minutes and then ceased to flow. During this short time the hemoglobin rose from below 10 per cent. on the Sahli scale to 20 per cent.; next day it was found to be 27 per cent.

From this single trial we have learned that the method proposed is as devoid of danger as other methods. We have found that a cannula corresponding to the outside diameter of the radial artery is readily introduced into this elastic vessel, and that the link may be advantageously reduced to a length of two or two and a half inches.

The stoppage of the flow was due to a small clot at the venous end of the link, within the vein; for when the cannula was withdrawn from the vein, the blood spurted freely through the link. The only partial success of the trial was, in our opinion, due to the deposit of a copper salt on the surface of the link. This may be avoided (as mentioned in Note 5) by using cannulae and wire frame both gold-plated.

* Read at a regular meeting of the staff of the John Crerar Library, March 24, 1909; also at the annual meeting of the Chicago Chapter of the Bibliographical Society of America, April 29, 1909. The historical data in this paper have been taken chiefly from Puschmann's "Handbuch der Geschichte der Medizin," Gurlt's "Geschichte der Chirurgie," and Sudhoff's "Tradition und Naturbetrachtung in den Illustrationen medizinischer Handschriften und Frühdrucke."

on vellum, comparatively few remarkable for rarity. The auction catalogue contains over 3,000 numbers, of which 894 come under the head of surgery, 434 under pathology, 270 under anatomy, physiology, etc., 122 under history and bibliography. Early medical and surgical writers are very largely represented, both in early and modern editions; the catalogue contains under this head about 600 numbers, and 15 or 16 of these were printed in the fifteenth century.

The object of the earliest printers was to reproduce manuscripts. If we keep this in mind, we shall better understand two peculiarities in which the incunabula and other early printed books differ from those of more modern times. It had not been the custom of the scribes to use a whole sheet of paper or vellum for a title-page; the material was much too expensive for such waste; and they were not in the habit of signing their names at the end of the manuscripts. The development of the title-page in the early printed books is an interesting chapter, but it would carry us too far to go into that subject now; as to the adding of the printer's name at the end of the book, in the colophon, I only wish to call attention to the fact that, while the scribe did not put his name at the end of the manuscript, the rubricator did, and the first book that contains in the colophon the name of its printer, the celebrated 1457 *Psalterium*, is particularly remarkable for its beautiful illuminated initials which were not painted by hand, but printed in colors from type, and to this fact the printers, Johann Fust and Peter Schöffer, call particular attention in the colophon.

The oldest book in Dr. Baum's library was printed in 1487, in Venice, by Baptista de Tortis. It has no title-page, nor is there anywhere in the book an indication of what its title might be; the first page is blank, the second contains the table of contents, which fills the whole page. The third page begins: "Incipit isagoge Joannitii ad tegni Galieni," i. e., "Here begins Johannitius' introduction to Galen's *Microtechne*," which latter is the first work contained in the volume. As a matter of fact, the volume is a collection of medical treatises, translated from the Greek into Arabic by the above-mentioned Johannitius, or Hunain ibn Ishāk, and from Arabic into Latin by Gherardo of Cremona. Other editions of the collection give it the title "*Articella*." Hunain ibn Ishāk was the most famous of those Arabic translators who did so much to preserve Greek literature during the middle ages. He was born in the year 809 and studied under the celebrated Mesuē in Bagdad, in which city he, after having spent some years in travel, settled as physician to the khalif; the latter encouraged him particularly in his translating the works of Greek medical writers into Arabic.

Bound with "*Articella*" is a copy of Avicenna's "*De anima*," the only edition of this work that was printed alone in the fifteenth century; the date of printing is not given, but it is probable that it was printed about the same time as the "*Articella*"; the printer was Antonio Carcano of Pavia. The two books are bound together in wooden boards covered by pressed leather with metal corners and clasps, though the main parts of the clasps have been broken off. On the outside of the front cover is a piece of vellum pasted on to it, with the inscription in medieval hand: "*Articella Avicenna de anima*."

An editio princeps of interest is the 1492 edition of John of Gaddesden's "*Rosa Anglica*," printed also in

Pavia, by Leonardo Gerla, for Giovanni Antonio Bireta, whose mark we find on the last page. It was the 1502 edition of this book that, on account of its somewhat peculiar, though perfectly correct imprint date, caused some bibliographers and librarians to record an edition of 1516, as Mr. B. A. Finney has told.¹ The author of this book is mentioned in Chaucer's "*Canterbury Tales*," and it has been suggested, it would seem with good reason, that he was the model for the "doctor of phisicke" of whom Chaucer says that "in all this world ne was ther none him like"; he was certainly one of the best known medical men of his time, and his book supplies much information as to medical practice and custom during the fourteenth century.

A book that is of interest on account of its publisher, as well as the author of the first work printed in it, is a collection of surgical treatises, beginning with Guy de Chauliac's "*Chirurgia magna*," or, as the author himself called it, "*Collectorium artis chirurgicæ medicine*." Guy de Chauliac was, from the year 1342 to his death, some time in the decade beginning 1360, physician to the popes in Avignon and a friend of Petrarch, though the latter otherwise was not favorably inclined toward the medical profession, and particularly not friendly to the physicians attached to the papal court. The "*Collectorium*" is, as its name implies, a compilation, but is of more value than most books of its kind and time, and served as a text-book of surgery as late as in the eighteenth century; the introductory chapter contains a short history of surgery, and we find also in the work an eye-witness' account of the Black Death which ravaged Avignon during his residence there. In this book we have an example of an embryonic title-page which briefly enumerates the titles of the work contained in it. It is printed by Simon of Lovere in Venice, in 1499, for Andrea Torresano, whose daughter Maria this same year married the elder Aldus Manutius; after Aldus' death and during the minority of his sons, Torresano was the manager of the Aldine press. This copy has a beautifully illuminated initial on the first page and a miniature in the margin of the same page.

Giovanni Michele Savonarola, grandfather of Girolamo Savonarola, is the author of two books bound together in pressed pig skin. He was born in Padua, where he received his degree of Doctor of Medicine and later became professor at the university. His "*Practica de ægritudinis*," the book bound first in the volume (the second being his "*Canonica*"), is a general handbook of medicine, based on his observations and experience, and is regarded as one of the best medical works that have come down to us from the middle ages. Both of these books were printed by Bonetus Locatellus for the publisher, Octavianus Scotus.

Two other books were issued by the same printer and publisher—the "*Practica*" of Yuhanna ibn Sarapion, a Syrian, by some called Janus Damascenus, but not to be confused with the elder Mesuē, who is also known by that name; and Pietro di Argellata's "*Chirurgia*," in which the author, who was professor at Bologna, quite frankly acknowledges mistakes in his practice and discusses them as warnings to his students.

Another printing-press in Venice which is represented here is that of the brothers Giovanni and Gregorio di Gregorii, from which several medical works were issued, both during the fifteenth century and the beginning of the sixteenth. Four books under consid-

1. Papers and Proc. Bibliograph. Soc. of America, 1, 71-74. Also Dock, George: Janus, Harlem, 1907, xlii, 425-435.

eration were printed by them: Alessandro Benedetti's "Collectiones medicinae," a small pamphlet without place, date or printer and by Mlle. Pellechet ascribed to Aldus, though Robert Proctor has since shown that the book was printed from types that belonged to the Gregorii; Bernard de Gordon's "Lilium medicinae," highly valued for its clearness and conciseness, and which gives a good idea of the standpoint of medicine in the thirteenth century; its author was professor at Montpellier from 1285 and dictated the present work to his students in the year 1305; the book has a wood cut on the title-page to the index, that to the work itself being quite plain.

"Theicrisi," or "Altheisir," is the title of the third book in this group; it has for its author Avenzoar, the latest of the great Arabian physicians.

The fourth book, called "Fasciculum Medicine," is of interest on account of its illustrations, which are the earliest examples of anatomic drawings reproduced in wood cuts, though the present edition, printed in 1500, is not the first (the first edition was printed in 1491); the author of the book, Johannes Ketham, was a German physician, living in Italy, but of whom nothing further is known; it should be said, though, that the illustrations are not original with him; some of them are of interest for the student of the history of costume and furniture.

Mondino da Luzzi's "Anathomia" is one of the three books in the collection that were printed in Germany. It has neither place, date nor name of printer, but it was printed with the same types with which Martin Landsberg printed in Leipsic after 1492, and has, therefore, been assigned to this printer; it was printed before 1500. Mondino was the first anatomist since the time of the Ptolemys to dissect human bodies, and his book was intended as a handbook for anatomic exercises. From 1290 to his death in 1326 he was a teacher at the university of Bologna.

The other two books printed in Germany are bound together; they are not medical in character, though one of them, Bartholomæus Anglicus (or Glanvilla's) encyclopedia, "De proprietatibus rerum," contains a good deal of medical information. It was printed with types used by a printer in Heidelberg whose name is not known, but who is commonly spoken of as "the printer of Lindelbach," after the title of one of his books. The work bound together with this, Werner von Rolewinck's "Fasciculum temporum," was one of the most popular books of its time. Leo Baer, in his work, "Die illustrierten Historienbücher des 15. Jahrhunderts," enumerates not less than thirty-four editions of it printed before the year 1501; the first two editions were printed in the same year, 1474, both in Cologne, but by different printers; the present edition is one of several printed by Johannes Prüss in Strassburg in the decade beginning 1490; but it does not bear his name nor is it dated. The author of this work was a Carthusian friar and inmate of the St. Barbara monastery in Cologne, where he died in 1502, 77 years of age. He was the author of several books, both historical and theological.

One volume still remains to be mentioned, though it is likely that it should not have been classed among the incunabula. It is an anonymous edition of the "Regimen Sanitatis Salernitanum," with Arnoldus de Villanova's commentary, a versified essay on hygiene prepared by the physicians connected with the famous school of Salerno for the benefit of Duke Robert of

Normandy, who in 1096 visited his relative, Duke Rugiero of Salerno, on his way to take part in the first crusade. Hain, Mlle. Pellechet and other bibliographers count this edition among incunabula, but Robert Proctor does not include it in the first part of his "Index to Early Printed Books in the British Museum," but merely refers to it as being "not fifteenth century." For my part, I have not been able to come to any definite conclusion, but have followed the lead of the majority in assigning to it tentatively the date 1500; I may say, however, that I have not been able to identify the type with which it is printed with any of those described in Haebler's "Typenrepertorium der Wiegendrucke"; when the section for Italy of the second part of Proctor's "Index" appears we shall probably be able to determine the date of the book; it is also probable that a closer study of the wood cut on the title-page will help to solve the problem.

STREPTOCOCCIC INFECTIONS OF THE THROAT *

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During the past few months a great deal of attention has been attracted to the subject of streptococcic infections of the throat, and there have been two contributions to the literature of the subject which are of more than ordinary interest. At the Chicago meeting of the American Medical Association last June, Dr. Alice G. Bryant, of Boston, read a paper¹ describing a series of cases in which the infection fastened on the so-called adenoid tissue found in the pharynx, and in which there were marked symptoms of infection, with temperature ranging from the neighborhood of 100 to 104 F., and at times a free discharge from the nose of a creamy consistency, masses of adenoid tissue sometimes being found in this discharge. Bacteriologic examination of the discharge in the cases reported by Dr. Bryant showed streptococci in abundance.

By far the most interesting article that I have seen on the subject, however, is that by J. O. Hollick,² Medical Officer to the Midland Counties (England) Idiot Asylum, in which is reported an epidemic of streptococcic or "septic" throats which prevailed in the asylum during April of last year, also a similar epidemic in his private practice. The first outbreak was thought to be due to the Klebs-Loeffler bacillus, but bacteriologic examination showed an absence of diphtheria and diphtheroid bacilli, with a plentiful growth of both streptococci and staphylococci. The epidemic occurred first among the nursing staff, and then spread to a number of the inmates. The general symptoms are summarized by Hollick as follows: malaise and pains in the back and neck were prominent, and violent headache in a few cases; no vomiting or other abdominal symptoms. Evening temperature often rose to 104, morning temperature 100 Fahrenheit. Slight soreness existed on one or both sides of the throat and difficulty in swallowing; the submaxillary and glands adjacent to the angle of the jaw and in the triangles of neck enlarged and tender. One or both tonsils showed creamy

* Read before the Memphis and Shelby County Medical Society, March 2, 1909.

1. Streptococcic Infections of the Pharyngeal Adenoid Tissue in Adults, THE JOURNAL A. M. A., June 13, 1908, 1, 1963.

2. Lancet, London, Dec. 19, 1908.