

the death of Barttelot, who was murdered by his carriers. It has not been stated how this news reached the coast, but, since the re-establishment of intercourse with Stanley Falls, its authenticity seems not improbable. The cable (London, Sept. 14) reports, "A despatch from St. Paul de Loanda states that Major Barttelot was shot on July 19 by his Manyema carriers. The head Arab and his men thereupon ran off to Stanley Falls, where Jamieson is making arrangements with Tippo-Tip for the organization of an expedition. He will proceed as quickly as possible. The London newspapers are unanimously of the opinion that Major Barttelot was betrayed by Tippo-Tip, who organized the native portion of the expedition; and the question is asked, Why may not Stanley have been also the victim of his treachery? Nyangwe, the home of Tippo-Tip, is three hundred miles distant from Stanley Falls. The first despatch said that Tippo-Tip was at Nyangwe. The second does not indicate whether he is still there, or has returned to Stanley Falls. Colonel De Winton is of the opinion that Barttelot was murdered between the twenty-eighth and twenty-ninth degrees of east longitude at about the second degree of north latitude. The Manyema twice attempted to take Livingstone's life. The second despatch removes from the Arabs the suspicion of treachery."

All the evidence tends to show that there is no intention on the part of Tippo-Tip to betray Stanley. Furthermore, it must be borne in mind that Barttelot at an early date had an encounter with natives of the same tribe, in which several of Tippo-Tip's men were killed. It seems that he was almost too energetic in his dealings with the natives.

A despatch dated London, Sept. 16, says, "Captain Vangele, who has just returned to Europe from the Kongo country, says he is convinced of Tippo-Tip's innocence of the murder of Major Barttelot. Tippo-Tip, he says, is engaged entirely in commerce, and had an interest in the success of Major Barttelot's expedition. The porters who accompanied the expedition were furnished by Tippo-Tip. They agreed that they should be paid on reaching Zanzibar, and to this fact Captain Vangele partly attributes the murder, because the payment of the porters depended upon the success of the journey. He thinks the strict discipline preserved by Barttelot may also have aroused hostility. He believes that Jamieson will find it difficult to organize a new expedition. Captain Vangele is convinced that Stanley is safe."

It is not quite clear to us whether 'Vangele' is the same Van Gèle who left Leopoldville on April 26 to occupy Stanley Falls. His return to Europe at this time seems hardly probable, although we do not know what has been going on on the upper Kongo during the last months.

Meanwhile committees are forming in various countries for the relief of Emin, or rather for supplying Emin with ammunition and opening a route to his province. Foremost in these endeavors is at present the German East African Association, but so far no definite results have been obtained.

MEDICAL MUSEUMS.

THE Congress of American Physicians and Surgeons closed its meeting in Washington last evening with an address in the National Museum from the president, Dr. John S. Billings, and a reception in the Army Medical Museum. Dr. Billings's audience was a large and appreciative one; and he made his address on medical museums, with special reference to the Army Medical Museum at Washington, exceedingly interesting as well as instructive and suggestive.

The necessity of economizing space prevents the reproduction here of the very interesting historical enumeration of the leading medical museums of the world, with which Dr. Billings opened his address, and we pass at once to the central topic, condensing as the exigencies of space demand. He said:—

"This collection, known as the Army Medical Museum, owes its inception to Dr. William A. Hammond, one of whose first acts after becoming surgeon-general, in 1862, was to issue a circular stating, that, 'as it is proposed to establish in Washington an army medical museum, medical officers are directed diligently to collect, and to forward to the office of the surgeon-general, all specimens of morbid anatomy, surgical or medical, which may be re-

garded as valuable, together with projectiles and foreign bodies removed, and such other matters as may prove of interest in the study of military medicine or surgery.' By the end of the year, over a thousand specimens had been collected, and the catalogue printed in 1866 showed that it contained 7,716 specimens. It is not my purpose in this address to trace the history of its development: that must be done elsewhere. It has recently been placed, with the library, in a conveniently arranged fire-proof building, and on the 1st of July last contained over 15,000 specimens besides those contained in its microscopical department, divided as follows:—

Comparative anatomy.....	1,689
Pathological.....	8,354
Medals.....	384
Microscopical specimens.....	10,416
Normal human anatomy.....	2,961
Instruments and apparatus.....	814
Microscopes.....	141
Miscellaneous.....	835

"Besides these, there are 375 specimens pertaining to normal human anatomy, and 726 to pathological anatomy, which are in what is called the 'provisional series.'"

"At first the Army Medical Museum was limited to military medical subjects; but of late years its scope has been greatly broadened, and is now nearly the same as that of the Royal College of Surgeons. It includes human anatomy, physiology, pathology, somatological anthropology, instruments and apparatus, and illustrations of methods of teaching connected with special departments of practical medicine. It does not at present include hygiene or materia medica, except in their immediate relations to the military medical service; and this for reasons which will be stated presently. That our National Medical Museum should be broad and comprehensive in its scope, there can be no doubt, its requirements in this respect being quite different from those of collections formed and used more especially for the purpose of teaching medical students. The most practically valuable of these last are those formed by individual professors to suit their own specialties and methods of teaching. They need not, as a rule, be large. I may even say that they should not be large; for the labor of properly preserving a large collection is great, and the student, with his limited time and want of knowledge of what to look for, can examine but few specimens so as to profit by them. For the same reason specimens of rare abnormalities, of double monstrosities, etc., are of little use in ordinary medical teaching as given in this country, and are not specially desirable in the museums of our medical schools.

"You may have noticed, that, in speaking of the scope of our museum, I said it included 'human anatomy.' This phrase does not mean that it has no specimens illustrating the structure of other animals, for it has many, and needs many more; but it means that in this department its main purpose is not to make comparative anatomy an end to itself by exhibiting all known variations in structure throughout the animal kingdom as a basis for their study in relation to development and environment, causation and results: in other words, it is not an anatomical museum, but a medical museum. The broad field of general biology, including natural history and comparative anatomy, will ultimately be covered by the National Museum; and in our medical collection it will be quite enough to illustrate human anatomy fully, using so much of the structure of the lower animals as will be useful in explaining why certain parts of the human body are thus and so, and not otherwise. No sharp line of distinction can be drawn between the field of work of the general and that of the medical museum. So far as morphology is concerned, they must necessarily overlap somewhat, since both want a certain number of the same specimens, although using them to illustrate different points of view.

"The kind of specimens most valued for illustrating anatomy in a museum is now very different from what was sought for in the first half of this century. Dried and varnished dissections showing blood-vessels, etc., are now looked on as nearly useless, and are kept only as historical relics. Elaborate dissections under alcohol, mounted in opaque dishes with flat glass covers, and sections of frozen bodies similarly mounted, are what the student and the practitioner most desire to see. In our museum there are some ex-

cellent specimens of this kind, prepared under the direction of Professor His of Leipzig, of Professor Cunningham of Dublin, and by our own anatomist Dr. Wortman. These, however, are only samples to show how the work should be done. We require several hundred such specimens to illustrate properly regional anatomy in relation to age and sex, while the possible applications of the same methods to the illustration of visceral displacements, hernias, and deformities of all kinds, are boundless. As regards physiology, but little can be done by museum specimens to illustrate function as distinguished from form and structure. The so-called 'physiological series' in the Hunterian collection is a series of organs illustrating variations in different families of the animal kingdom, or at different ages: in other words, it illustrates ontogenic and phylogenetic development. The things students or teachers of physiology are most anxious to see in a museum are specimens of instruments and apparatus employed in experimental physiology, or in the measurement of the special work of different organs, or in illustrating lectures on physiology. Illustrations of results obtained in experimental pathology often belong quite as much to physiology; as, for example, specimens of results of Gudden's atrophy method.

"The Army Medical Museum has only a beginning of such an anatomical collection as I have indicated as desirable. Like all other museums, it is richer in specimens illustrating osteology than in any other branch of anatomy, simply because such specimens are the easiest to obtain and preserve. We are accustomed to think that human anatomy is nearly exhausted as a field for original research, and that, at all events, every important organ or muscle or nerve has been figured, described, and named. Granting this, so far as the adult is concerned, although it is by no means true even for him, we have still to study the development of each of these organs, or groups of organs, as seen at different ages, and, for some of them, in different races. As fast as these points are seen to be of practical interest, either in connection with diagnosis or the surgical treatment of disease, they are investigated; but an ideal museum should furnish the investigator the means for his researches, and it must therefore collect specimens without special regard to what is at present known to be their practical interest. The collection of such series of specimens of each joint, region, and organ, as I have in mind, including sections and dissections at different ages, from the earliest appearance in foetal life to extreme old age in man, and in many cases in the lower animals, is a slow process. Such specimens, and especially such series of specimens, can only be prepared by a skilled anatomist, and there are few such: hence the formation of our ideal anatomical collection, limited though its scope may be, must be a work of time.

"Having obtained the specimens, the next difficulty is so to prepare and preserve them that they shall be available for study. The great majority cannot be preserved in such a manner as to retain their natural color, size, and texture. No doubt, more might be done in this direction than is usually done. It is possible to stain or paint portions of specimens in such a way as to give some idea of the normal appearances; but thus far, I think, experience shows that the best medium for the permanent preservation of wet pathological specimens is alcohol, and this will contract and harden most tissues, and remove the color from nearly all. It is also an expensive mode of preservation for large collections, and requires constant care to prevent the effects of evaporation. It does not follow, however, that such specimens are of little value, and that, as some have urged, it would be better to seek to obtain records of the results of disease by colored drawings or models. The pathological specimen, whether seen at the post-mortem, or years afterward in a museum, is, to the scientific pathologist or the practical physician, merely a sign or hieroglyph of the morbid process which has produced it: it is a result, in most cases, of interest not in itself, but because of the preceding phenomena which it connotes. As Sir James Paget has said, the same objection, viz., that museum specimens are unfit for the teaching or the study of pathology, might be made to the study of botanical specimens in an herbarium. 'In both cases alike, the changes produced by preparation are so far uniform that any one accustomed to recent specimens (and no others should study either herbaria or pathological collections) can allow for them or "discount" them. Just as an anatomist can discern, in a recent specimen of disease, the healthy

structure, so, but often much more clearly, can the pathologist or any careful student discern in the prepared specimen the chief characteristics of the disease.' Colored drawings, casts, and models are of great value in supplementing original specimens, but they cannot wholly replace them.

"One of the most important sections of our museum is that devoted to microscopy, including normal and pathological histology and photomicrographic work. In the cabinets there are nearly 11,000 mounted specimens, illustrating almost every field of microscopical research. Many of these were made twenty years ago, and more, and were mounted by processes which have not given good results; so that Dr. Gray, who is in charge of this section, estimates that about 3,000 will be set aside as worthless; but the rest form a very valuable series, to which additions are being constantly made, and materials for which we are specially anxious to obtain. In connection with this section, a series of cultures of chromogenic and pathogenic bacteria is kept up for museum exhibits, and also to illustrate methods of work.

"While the great majority of the specimens in a medical museum have some relation to diagnosis, prognosis, or therapeutics, the number of those which are of direct interest to the so-called practical physician is not very great. It includes models and casts illustrating dermatology, morbid growths, the results of amputations, excisions, plastic operations, etc., and instruments, apparatus, dressings, etc., of all kinds. Here also may be classed hospital fittings and furniture, means of transportation for sick and wounded, model cases of instruments, emergency chests, etc. Our medical museum has a fair beginning of a collection of this kind, including over a thousand specimens; but many more are needed to make it reasonably complete. If each medical man who devises a stethoscope, a pessary, a speculum, an ophthalmoscope, or an electro-therapeutic appliance with which he is well pleased, would send a specimen to the collection, its increase would certainly be rapid, and it could always show the latest improvement.

"The Army Medical Museum contains what may seem a large amount of material relating to human osteology, and especially craniology, in its relations to North American ethnology, or the history of the development of different varieties of man on this continent; but it is not actually half large enough to permit of drawing definite scientific conclusions from it. The majority of the crania which it contains have been measured to a certain extent, and the results have been published; but many other measurements are desirable to permit of comparison with series taken elsewhere, and even measurements already made must be repeated by later and better methods. We have been trying some experiments with composite photography and superimposed contour tracings as a means of obtaining typical outlines and dimensions for race groups of crania, and these give promise of good results. If the collections of crania of North American Indians in Boston, New York, Philadelphia, and Washington could be brought together, a very much better average representation of the majority of tribes or groups would be obtained than can be furnished by either of these collections taken separately. By composite photography and tracings, combined with uniform methods of measurement, we can practically bring these collections together, and obtain results nearly as satisfactory as if we had them all in one room. We have also fitted up one large room with instruments and apparatus for anthropometry in its widest sense, including psychophysical investigation; and it is intended to make this a complete laboratory for illustration of methods of work.

"An important feature of our National Medical Museum should be to show methods of research and of instruction for the benefit of the investigators and teachers of the country. This includes instruments and apparatus, and, to a limited extent, illustrations of the modes of using them and of the results; it also includes diagrams, models, etc., used for illustrating lectures. For example: as soon as Koch's researches became known in this country, physicians, and especially medical teachers who visited the museum, asked if we could show them the apparatus used by Koch and Pasteur in bacteriological work, and eagerly examined the few specimens of cultures on solid media which we were able to exhibit. The anatomist comes to the museum quite as much to see methods of mounting and preservation as to see the specimens

themselves; the physiologist does not expect to see function directly exhibited, but he does hope to find information about kymographs and constant-temperature apparatus, and he wants to see whether Kühne's artificial eye is so useful for teaching purposes that he ought to get one to illustrate his lectures.

"Medical museums are not, as a rule, freely open to the public, nor are they collected or arranged with reference to interesting or instructing non-professional persons. The Medical Museum at Washington is the chief exception to this rule; and it is so, because it was placed in Ford's Theatre, the scene of the assassination of President Lincoln. Many visitors to Washington, both men and women, wished to see this memorable spot, and, in doing so, necessarily went through the museum. This gradually led to the adjusting of the specimens exhibited with a view to the fact that they were to be seen by a number of non-professional persons of both sexes. Certain groups of specimens were put aside and not shown, except to persons known to be physicians, while other groups were given prominent places because they interested the public, although not of great professional or scientific value.

"I have time for only a very condensed statement of the wants of our National Medical Museum. In the first place, it needs the intelligent interest and friendship of the medical profession of this country. To a very considerable extent it has had this. Were it otherwise, it would not be what it is, nor where it is. But it needs more of it, and it can never have too much. Every medical man in this country should help a little, and provide for the perpetuation of his name as that of a physician interested in the progress of the profession, by sending at least one specimen to it. It is omnivorous in its demands for material, as will be seen by the circular which it has recently issued. But I will name as special wants, human embryos, especially those of a very early age; monstrosities and malformations of all kinds in man or in the lower animals; results of old injuries, such as fractures or dislocations, or of surgical operations, such as excisions, stumps, etc.; injuries and diseases of the eye, ear, and nose; new growths of all kinds; diseases of the brain and spinal cord; and specimens illustrating the condition of bones, joints, brain, larynx, and other organs, in extreme old age.

"In the second place, it needs a regular supply of funds from the general government. To form and keep in proper condition such a medical museum as this should be, is a more difficult and expensive matter than those not acquainted with such work would suppose; and the gifts of specimens from the profession must be supplemented by ample means for the preparation, preservation, and proper display of these specimens, and also for the purchase of apparatus and typical specimens of foreign work, in order that the museum may be always able to show the latest state of knowledge and the best ways of doing things.

"The annual appropriation for the museum at present is \$5,000. This is sufficient, except that the printing of the catalogue, of which I shall speak presently, must be an extra charge; but the medical profession should see to it that the amount is not reduced in the rhythmic spasms of partial economy with which some of our statesmen are afflicted.

"The third need of the museum is a series of the right kind of descriptions of its specimens, given on labels and in a catalogue. Unaided by such descriptions, it has for each man that which he can see in it, and no more. One man will see nothing but an old piece of bone, a shapeless mass of tissue bleached by alcohol, a case of old dingy brass instruments. Another will see in the same things a rare joint atrophy, implying curious abnormal nerve-influence; a leprous nodule, whose history, if we knew it, would reach back through the lazar-houses of the middle ages to the far east, and whose bacilli may be the lineal descendants of those that vexed Naaman the Syrian; a case of microscopes illustrating the development of that instrument, from the first rough iron tube of the spectacle-maker of Nuremberg, to the delicate and complicated instrument through which we now peer curiously into that world which lies within the world of unassisted vision. By our labels and catalogues we must tell men what to see, but to do this we must first see ourselves. The aphorism that a first-class museum should consist of a series of satisfactory labels with specimens attached, means a good deal. Something has been done in this

direction, as you will see on inspection of the cases; but I often wonder what sort of labels a man who has spent years in investigating the normal and abnormal structure and relations of one organ would write for our specimen of that organ. Such help as this we need, — kindly, truthful criticism, the pointing-out of errors and of new points of view for this mass of material.

"We also need a series of printed catalogues. One of these should be in the form of compact handbooks relating to particular sections of the collection, and intended partly for the use of visitors while in the museum, and partly as a ready means of letting distant friends know what material it most needs in different departments. It should also print a complete illustrated catalogue of the whole collection, for the use of the investigators and teachers of the profession. Congress has been requested to grant authority for the printing of such a catalogue by the government printer. The material for it is nearly ready, and it would make three volumes, each the size of one of the volumes of 'The Medical and Surgical History of the War of the Rebellion.'"

A BIBLIOGRAPHY OF METEOROLOGY.

As the literature of the several branches of science is increasing in volume, new scientific journals springing up every month, and valuable material being published in popular serials, bibliographical work comes to be an absolute necessity. This accounts for the numerous attempts at indexing the existing literature, and thus economizing the valuable time of scientists. A bibliography of any branch of science, once published, becomes the most fruitful source for further progress, as it is only thus that existing researches can be profitably made use of. Duplication of old work is avoided, and the compilation of the existing literature on a certain problem, which, without such an aid, is a source of indescribable annoyance and waste of time, is made easy. It is particularly in great scientific institutions, whose collaborators are numerous and frequently stationed in distant places, that, by the help of bibliographies of this kind, a large amount of labor and money is saved, the funds appropriated for their publication being thus well invested. The benefit to the advancement of science accruing from complete bibliographies is self-evident, and we need not dwell upon it.

The scientific bureaus of the United States Government have always been well aware of these facts. The great subject-catalogue of the Army Medical Museum, the bibliographies of the United States Geological Survey and of the Bureau of Ethnology, as well as those published by the Smithsonian Institution, testify to this; and their value is highly appreciated by all students, and has greatly aided the progress of science.

In this connection we may mention the 'Index to the Literature of the Spectroscope,' by Alfred Tuckerman, and that of the literature of columbium by Frank W. Traphagen, published among the Smithsonian miscellaneous collections. In an introduction to the former, Professor Langley well says, "With the rapid accumulation of scientific memoirs and discussions, published from year to year in numerous journals and society proceedings, a constantly larger expenditure of time and labor is required, by both the investigator and the student, to learn the sources of information and the condition of discovery in any given field. Hence is felt the growing need of classified indexes to the work done in the various fields of research, and hence the growing tendency of the age to supply such demand."

The great scientific societies consider these subjects among those calling for the most careful and immediate consideration; and thus the second of the bibliographies mentioned above sprung from the recommendations of the committee on indexing chemical literature, of the American Association for the Advancement of Science.

In meteorology the want of a bibliography is sorely felt. It is therefore with great gratification that we learn of the completion of the 'Signal Service Bibliography of Meteorology,' — a work anxiously looked for by all meteorologists and geographers. In its present form, it consists of a card-catalogue, which is in use in the bureau of the Signal Office. In his last annual report, General Greely, the chief signal-officer says, —

"The practical value of such a bibliography has been fully shown by its constant use in current office-work, and, in addition to the