Descriptive catalogue of the anatomical and pathological specimens in the Museum of the Royal College of Surgeons of Edinburgh / [edited] by Charles W. Cathcart ... Vol. I., The skeleton and organs of motion.

Contributors

Royal College of Surgeons of Edinburgh. Museum.
Cathcart, Charles W.
Hart, Ernest
Bristol Medico-Chirurgical Society. Library
British Medical Association
James Thin Bookseller
University of Bristol. Library

Publication/Creation

Edinburgh : James Thin, 1893.

Persistent URL

https://wellcomecollection.org/works/jwgtycx7

Provider

Special Collections of the University of Bristol Library

License and attribution

This material has been provided by This material has been provided by University of Bristol Library. The original may be consulted at University of Bristol Library. where the originals may be consulted.
This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.

wellcome collection

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

Y.6

B4a5

The Library of the
Bristol Medico-Chirurgical Society.

PRESENTED BY

The British Medical
Association

June 19th 1900.

Store 579159

Digitized by the Internet Archive
in 2015

https://archive.org/details/b21446714

LIBRARY OF THE
PRESENTED BY
ERNEST HART Esq.
BRITISH MEDICAL ASSOCIATION

With the Publisher's Compliments

DESCRIPTIVE CATALOGUE

OF THE

ANATOMICAL AND

PATHOLOGICAL SPECIMENS

IN THE MUSEUM OF THE

Royal College of Surgeons of Edinburgh

LIBRARY OF THE
PRESENTED BY
ERNEST HART Esq
BRITISH MEDICAL ASSOCIATION

BY

CHARLES W. CATHCART

CONSERVATOR : FELLOW OF THE COLLEGE

VOL. I.—THE SKELETON AND ORGANS OF MOTION

PRINTED AT

THE EDINBURGH PRESS, 9 & 11 YOUNG STREET

PUBLISHED BY

JAMES THIN, EDINBURGH

1893

PRICE SEVEN SHILLINGS AND SIXPENCE

UNIVERSITY
OF BRISTOL
MEDICINE

LIBRARY OF THE
PRESENTED BY
ERNEST HART Esq
BRITISH MEDICAL ASSOCIATION

PREFACE.

THE Museum of the Royal College of Surgeons of Edinburgh dates from about the end of last century. Although the specimens were only formally entered in the General Catalogue about 1807, many of those afterwards added had been collected before that time. Under the fostering care of Robert Knox, W. M'Gillivray, John Goodsir, H. Lee, W. Sanders, J. Bell Pettigrew, and R. Blair Cunynghame, the general collection has steadily increased by donations of individual specimens and preparations, but it has also been enriched from time to time by collections formed by private persons. Of these, the most important is the "Bell Collection," which will be afterwards referred to, but many others must also be mentioned. Thus there were the Collections formed by one of the College Professors of Surgery, an office now obsolete, Professor John Thomson, and those formed by Messrs James Russell, afterwards Professor in the University of Edinburgh, and Robert Allan; the Series of Urinary and Biliary Calculi collected by Dr William Newbigging; the admirable Dental Collection formed by Mr Nasmyth; and the preparations, casts, and instruments illustrating Ophthalmic Surgery collected by Mr William Walker. In more recent years Dr C. E. Underhill presented his Midwifery Museum to the College, and Dr

Thomas Keith, on leaving Edinburgh for London, handed over to the Conservator a Series of Tumours illustrating his work in Abdominal Surgery. Dr Bryan C. Waller has presented to the College a collection of Specimens illustrating Medical Pathology, which he purchased from Dr Rutherford Haldane. Besides these, there have been added other smaller collections, to which it does not seem necessary to refer in detail.

The "Bell Collection"* was purchased from Mr, afterwards

---

* The following account of the Bell Museum was published in 1819, while it was still in Great Windmill Street, London. Although many additions were made to it in the subsequent six years, the account is valuable as a record of the mode of formation of the Museum :—

"The formation of this Museum may be divided into three periods—that formed by Mr Wilson, that formed by Mr Bell, and the addition made during the last seven years.

"Mr Bell's original Collection consisted of preparations, both of Natural and Morbid Anatomy. It was particularly valuable in Quicksilver Preparations; in Preparations of the Lymphatics; in Diseased Bones; in Diseases of the Bladder and Urethra; and in Models of Diseased Viscera.

"The Collection of Mr Wilson was remarkable for the exquisitely neat manner in which the preparations had been dissected and preserved. Its value was principally in the complete Series of Preparations, exhibiting the Minute Structure, and arranged so as to correspond with the Lectures. These must always form an important part of the Present Museum from their intrinsic value, as well as from the Maker, who learned his art under the celebrated Mr Cruickshank (the fine Collection of Mr Cruickshank was bought by the Empress of Russia), the Colleague of Dr Hunter.

"By the arrangement betwixt Mr Wilson and Mr Bell, Mr Wilson's Preparations became the property of the latter, and the two Collections were united. Since that period, that is, in the last seven years, great additions have been made (not less than one-third of the whole). To the pupils of that period, it is not necessary to say that this has been done principally through the labours of Mr Shaw. Mr Shaw was a pupil of Mr Bell's at a very early age, and has continued making Preparations under him for eleven years."

Sir Charles Bell in 1825, and is now incorporated in the general collection, of which it forms a very valuable part.

Most of the specimens referred to in Sir Charles Bell's published works are thus to be found in this Museum. In this way it happens that besides the actual specimens which his keen interest in all physiological and pathological questions led him to preserve, we have in many instances the advantage of a description of their clinical history from his graphic pen, and sketches of their clinical appearances from his still more graphic pencil.

The "Barclay Collection," chiefly of Human and Comparative Anatomy Specimens, forms a part of the Museum of the Royal College of Surgeons of Edinburgh, but by the deed of presentation it is kept separate from the rest and stands in a Hall by itself. It contains a few Pathological Specimens, but these unfortunately cannot be used to enrich the General Collection, although in one or two instances casts of the specimens have been made for that purpose.

The former printed Catalogue of the Museum was compiled by Dr M'Gillivray, afterwards Professor of Zoology in Aberdeen, and was published in 1836. It included all the Specimens, Casts, and Drawings then in the Museum illustrating Pathology, but none of those illustrating Human or Comparative Anatomy.

The present Catalogue has been very carefully drawn up with the express purpose of making the Collection practically useful to students and members of the Medical Profession. An erroneous view of pathological Museums — altogether

foreign to that of our Museum founders—is unfortunately common, namely, that they are collections of mere pathological curiosities, the study of which is something quite different from that of practical Medicine and Surgery. It is needless to say that this is an entire misconception, for a properly arranged Museum obviously offers an insight into the varieties and consequences of injury, and into the natural history of disease, which clinical study alone cannot supply. The object held in view, therefore, in classifying, arranging, and describing the specimens for the present Volume, has been to bring them into line with clinical work. This has required so much re-arrangement and re-description of the specimens in the Museum, that the present is essentially a new Catalogue rather than a second edition of the old one.

Various illustrations of General Pathology form the first Series. The specimens it contains illustrate certain aspects of Hypertrophy and Atrophy, of Inflammation, Degeneration, and Repair, which could not otherwise be so well compared. Every effort, however, has been made to limit it, and it does not include Tumours, for reasons that will be afterwards explained.

In the Specimens illustrating special Pathology the larger Classes have been formed upon the usual Physiological basis, and are such as "the Skeleton and Organs of Motion," the affections of which occupy the present volume; also "the Alimentary Canal," "the Respiratory System," and others, which will be taken up in a subsequent volume or volumes.

Within the first Class there have been formed three Divisions—*i.e.* (1) the Bones and Joints; (2) Muscles and Tendons,

Synovial Sheaths, Bursæ, and Fasciæ, and Connective Tissue; and (3) "the Limbs as a whole." The specimens thus included have been formed into ten Series (see general Analysis). The Series are numbered consecutively throughout the divisions of the first Class, and it is intended to carry on the numbers of the succeeding Series continuously through the Classes and Divisions which have yet to follow. Within each Series, however, the numbers of the individual Specimens begin anew. In the Bell Collection, a Series of specimens illustrating the normal structure of each organ preceded those illustrating its abnormal conditions. This method was discarded when the previous Catalogue was drawn up, but has now been re-adopted. The same principle has moreover been carried out among the individual Pathological specimens, where a still closer proximity of the normal and abnormal seemed advantageous.

Nothing need be said about the mode of subdividing the first five Series, but of that employed in the sixth—"Diseases of Bone"—some explanation seems advisable, especially as, with certain modifications, it has been applied to the Series which follow. Under the general title "Diseases of Bone" four main groups have been recognised, *i.e.* I. Abnormalities in growth or development, which are chiefly, of course, congenital; II. Alterations due to local or general affections of Nutrition; III. Inflammatory Diseases; and IV. Tumours or New Growths. The subdivisions of the first and second of these groups may be sufficiently studied in the General Analysis; but of those of the third group—*i.e.*, Inflammations—a short explanation may not be out of place. The view of Inflammation which

underlies the classification here adopted, is that enunciated by Lister* in 1858, and emphasised afterwards by Cohnheim, Burdon Sanderson, and others, namely, that Inflammation is not so much a disease in itself as a consequence of interference with the vitality of the tissues. Causation of Inflammation has therefore been chosen as the basis of primary subdivision, and the modes of interference with vitality, or causes of Inflammation, are thus the distinguishing features of the larger groups. Although it is difficult to conceive how much we may still have to learn on this subject, the knowledge acquired in recent years seems sufficient to justify the plan adopted, even should it require to be afterwards modified. As it stands, this plan carries with it at least two distinct advantages. Museum specimens are by its means arranged in accordance with present clinical and pathological knowledge. This is obvious, but in addition the confusion which has so frequently arisen from a "cross classification" has been avoided. Such headings as "Necrosis," "Periostitis," and "Syphilis" are commonly used as co-ordinate yet distinct subdivisions of bone disease; but as the first indicates "result," the second "locality," and the third "causation," the groups are not mutually exclusive, and uncertainty and confusion is the necessary consequence. The place for "result" as a basis of subdivision of diseased bones seems to be within each of the larger groups formed upon the basis of "causation," to which it thus becomes of subsidiary importance. In the case of Syphilitic diseases of bone, those of the

* Philosophical Transactions, 1858.

Skull have been kept separate from those of the rest of the skeleton; but with this exception, "locality" has not been used as a basis of subdivision in this Series. Nevertheless, an examination of the groups formed will show that "locality" has accompanied the "results" due to the various "causes" in a remarkably close way. Thus there are various forms of necrosis, caries, and enlargement, depending upon different causes, and showing corresponding differences, but also locating themselves mainly in different bones, or forms of bone tissue. "Locality" might therefore have been used as subsidiary to "result" through all the groups of bone disease had it seemed necessary. Among joints, on the other hand, "locality" has been considered of more importance, and has been used to divide and subdivide the specimens ranged under the various causes of Inflammation. In every case we must remember that "the division must be founded upon one principle or basis," *i.e.*, "some quality or circumstance," which, in order to be taken as the basis of sub-division, "must be present with some and absent with others, or must vary with the different species comprehended in the genus."* What that basis is will depend upon the general character of the specimens, the state of knowledge at the time the classification is made, and the judgment of the classifier.

It is true that some forms of cross-classification still remain, but while they seem inevitable, they are less likely to confuse than those now excluded. Thus, for example, many diseases of joints affect chiefly the bones; compound fracture may lead to

---

* Jevons' "Elementary Lessons in Logic," 1893, p. 105.

disease of bone; and, again, many diseases of stumps are really only diseases of the bone. In such cases the specimens have been placed in what seemed the more important group, and representative specimens, or cross references, have been put in the other group to which they may be considered also to belong.

The subdivision of the fourth group, Tumours, or New Growths, is based upon the view that they are essentially modifications of growth, and not merely responses to irritation; further, that they take their type from the tissue from which they arise, and that they vary in their rate of growth and degree of malignancy. Consequently, no attempt has been made to form a general group of "Tumours," but instead, each Pathological Series has its department for "Tumours," just as it has for "Inflammations" of various kinds.

The order in which the individual specimens have been arranged within the groups has been based upon the following general principles.

Among Fractures the larger groups have, as is usual, been based upon "locality," *i.e.*, the bone, or special part of it which has been broken. Within the groups thus formed, the specimens have been classed as recent, and of old standing, and the latter again as united or ununited. Other groups of injuries have been similarly treated.

Among Malformations, the lesser degrees have been placed before those more pronounced.

In Inflammations, early stages of disease have been placed before those more advanced, in order to illustrate the successive phases of the particular malady. These have been followed,

when possible, by others, illustrating spontaneous cure, and lastly, by those which show the results of operations.

Among Tumours a study of the clinical history and naked-eye appearances seems a better foundation for their arrangement in a Museum than their microscopical characters. Consequently, the Tumours of any particular tissue or organ will be found to range from the simple, well-developed, slow-growing forms to those which grow quickly, are undefined in structure, and are clinically malignant. The microscopical characters of any specimen have been looked upon as an adjunct to its description rather than as an essential element in its classification.

It follows, as a natural consequence from the above method of arrangement, that all the contents of the Museum which represent a certain degree of deformity, stage of disease, or kind of tumour have been grouped together. Formerly, in this as in many other Museums, spirit preparations were placed in one part of the Museum, dried preparations in another, casts in a third, and drawings in a fourth. Now, they are all classed together in the Catalogue when they belong to the same or to similar specimens. Where, owing to variations in shape and size, some of the individual members of a group could not be conveniently placed upon the shelves with the rest, every effort has been made to place them so close to the others that the student can refer to them without loss either of time, or of a sense of the general continuity. In many cases published drawings of the patients from whom the specimens were taken have been copied by photography and placed beside the specimens they illustrate.

Each specimen is furnished with its Series-number, followed in smaller type by its own number within the Series. These numbers are of course repeated in the Catalogue. The plan of giving to the description of each specimen a general heading in bold type has been adopted from Sir George Humphry's Catalogue of the Cambridge Museum and from the revised edition of the Catalogue of Guy's Hospital Museum. This heading is followed in the same paragraph by a statement of what the specimen is, and by an account of how it has been prepared and mounted. Next comes the clinical history in small print. Every effort has been made to obtain these histories of the specimens. The various manuscript Catalogues contain many, which were either not used at all, or only briefly abstracted in the previous Catalogue. These have now been largely drawn upon. In addition, every available clue has been followed that promised to lead to a clinical account of any of the specimens, whether in the old Infirmary records, or in the published writings of the donors of the specimens. It is to be regretted that this has been possible with only a limited number of the specimens, and it may be assumed that where no clinical history is given, none has been accessible to the present conservator. In natural sequence after this paragraph, follow, in larger type, the descriptions of the specimens in their recent state (when obtainable), and as they are permanently to be seen in the Museum. Last of all are added such comments as seemed desirable.

Before the donor's name, the Manuscript Catalogue number has been given to facilitate further reference if required. G.C.

means the General Manuscript Catalogue, in which all specimens presented to the Museum are entered, unless they have formed part of a collection provided with a separate Catalogue. B.C. refers to the MS. Catalogue of the "Bell Collection;" and W.C. refers to the MS. Wilson Catalogue. Although the specimens in the "Wilson" Collection were transferred to the "Bell," it has been considered better in the case of important pathological specimens to refer when possible to the original source of information. A considerable number of the specimens described in the former printed Catalogue had not been entered in any other. This is specially true of those presented by Professor John Thomson. They are referred to now as F. P. C. (Former Printed Catalogue), followed by the corresponding number.

When the date of the presentation of any specimen to the Museum is not stated, an approximation to the date may be obtained from the following general statement as to the entries in the General Manuscript Catalogue:—The numbers had reached to 805 in 1826, to 1216 in 1830, to 2272 in 1842, to 2415 in 1857, to 2467 in 1865, and to 2764 in 1886.

The Conservator wishes here to record his thanks to the Presidents and Council of the College and to the Members of the Museum Committee for the hearty encouragement which they have given to him throughout his work for the present volume. He would be very ungrateful, too, if he were to forget to mention another to whom his thanks are especially due. Tentative arrangements and re-arrangements of the specimens have, of course, been required; taking down and re-mounting

the specimens for careful examination has also been frequent. In all this the Conservator feels it but right to say that his work has been greatly facilitated by the manipulative skill and ingenuity, by the exactness and conscientious care, and perhaps, most of all, by the unfailing patience and goodwill, of his able assistant Mr George Reid.

LIBRARY OF THE
PRESENTED BY
ERNEST HART Esq
BRITISH MEDICAL ASSOCIATION

GENERAL ANALYSIS

GENERAL PATHOLOGY.

Series 1.—General Pathology.

	No. in Series.	Pages.
HYPERTROPHY—		
Physiological, *i.e.* associated with increased function	1-3	1, 2
Compensatory, *i.e.* from artificially increased demand on function	4-8	2-4
Irritative, *i.e.* from irritation of various kinds	9-12	4, 5
From altered nutritive conditions	13	5
From unknown causes	14, 15	5, 6
From absence of usual modes of removal	16, 17	6, 7
ATROPHY—		
Physiological—from old age	18	7
From diminished function	19-22	7
From various causes	23-31	8-10
INFLAMMATION—		
Various illustrations of	32-41	10-12
REPAIR OF INJURIES—		
Healing by first intention	42-47	13, 14
Healing by second intention	48-51	14, 15
DEGENERATIONS AND INFILTRATIONS	52-60	15-17

SPECIAL ANATOMY AND PATHOLOGY.

CLASS I.—THE SKELETON AND ORGANS OF MOTION.

DIVISION I.—BONES AND JOINTS.

Series 2.—Structure and Development of Bone.

	No. in Series.	Pages.
Structure of bone	1-9	18-20
Process of development in general	10-17	20, 21
Development in particular—		
The Skeleton as a whole	18-22	21, 22
The Skull	23-33	22-24
The Spine	34-40	24, 25
The Thorax	41-46	25, 26
The Upper Limb	47-68	26-31
The Pelvis and Lower Limb	69-104	31-37
Structure of Foot	105-109	37, 38
Comparative Anatomy	110-112	38

Series 3.—Injuries of Bone.

Fractures of the Skull—		
Fissured Fractures	1-15	39-45
Comminuted fractures chiefly localised	16-29	45-50
Comminuted fractures with fissures leading from them	30-37	50-53
Compound fractures	38-45	54-57
Healed fractures	46, 47	57, 58
Gunshot fractures	48-57	58-62
Sabre wounds	58-60	62, 63
Fractures of the Lower Jaw	61-63	63, 64
Fractures of the Spine	64-91	64-79
Fractures of the Thorax	92-94	79, 80
Fractures of the Clavicle	95-101	80-82
Fractures of the Scapula	102, 103	82
Fractures of the Humerus	104-126	82-90
Fractures of the Radius and Ulna	127-143	90-96
Gunshot fractures of the Upper Limb	144-164	96-102
Fracture of the Pelvis	165	103
Fractures of the Neck of the Femur—intra-capsular	166-184	103-109

Series 3.—Injuries of Bone—*Continued.*	No. in Series.	Pages.
Fractures of the Neck of the Femur—extra-capsular	185-205	110-118
Fractures through the Trochanters	206-209	119, 120
Fractures of the Shaft—recent and uniting	210-219	120-124
Fractures of the Shaft—united	220-241	124-131
Fractures of the Shaft—un-united	242, 243	131
Fractures involving the Knee-joint	244-249	132-135
Fractures of the Patella	250-259	135-137
Fractures of the Tibia into the Knee-joint	260-262	137, 138
Fractures of the Tibia—recent and uniting	263-269	138-140
Forms of fracture and mode of union	270-277	140-143
Fractures of Tibia and Fibula—united—		
A. From direct violence	278-285	143-146
B. From indirect violence	286-290	146, 147
Fractures of the Tibia—united	291-297	147-149
Fractures of the Tibia—un-united	298, 299	149, 150
Fractures of the Fibula	300-303	150, 151
Fractures into the Ankle-joint—		
a. Chiefly involving the Tibia	304-310	151-153
b. Chiefly involving the Fibula	311-318	153-156
Fractures of the Tarsal bones	319-321	156, 157
Gunshot fractures of the lower limb—		
(*a*) Chiefly from Waterloo	322-377	157-176
(*b*) From the Crimea	378	176
(*c*) From the American War (1861-65)	379-390	177-182
Comparative Pathology of Fractures	391-399	182-184
Series 4.—Structure of Joints	1-38	185-190
Series 5.—Injuries of Joints.		
Dislocations of the upper limb	1-12	191-195
Dislocations of the lower limb	13-24	195-198
Series 6.—Diseases of Bone.		
I. Abnormalities in Growth or Development.	1-4	199, 200
a. From deficiency in development	1-3	199-200
b. From excess in development	4	200
II. Changes produced by Conditions affecting the Nutrition of Bone—		
A. Changes in old age	5-10	200-202

Series 6.—Diseases of Bone—*Continued.*

	No. in Series.	Pages.
B. Changes from various local conditions .	11-16	202-205
C. Changes from affections of the central nervous system	17-21	205-208
D. Alterations due to conditions apparently constitutional but more or less obscure—		
(*a*) Rickets	22-51	208-220
(*b*) Osteo-malacia . . .	52-55	221-224
(*c*) Ostitis Deformans . . .	56-58	224, 225
III. Inflammatory Changes in Bone.		
1. Changes in bone due to inflammation in the neighbouring soft parts . . .	59-77	225-232
2. Inflammation of bone produced by mechanical or chemical irritation . . .	...	...
3. Inflammation of bone produced by pus-forming organisms		
A. Where the organisms have reached the bone through the circulation . . .		
a. Where important changes have not had time to develop . . .	78-81	232-234
b. Where the chief changes are in the form of rarefaction and absorption .	82-87	234-238
c. Where the chief changes are in the form of enlargement . . .	88-93	238-240
d. Where the changes in the bone tissue have resulted in an abscess . .	94-102a.	240-246
e. Where the chief changes are in the form of necrosis		
(*a*) Where the dead piece has been in process of separation . .	103-114	246-251
(*b*) Where the dead piece has become loose, but has remained in position	115-133	252-259
(*c*) Sequestra, or dead pieces which have been separated . . .	134-155	259-265
(*d*) Repair after separation of sequestra	156, 157	265, 266
B. Where the organisms have reached the bone through wounds . . .		
a. Disease in bone secondary to ulcers .	158-162	266-268
b. Where the chief changes are in the form of rarefaction	163-170	268-270

Series 6.—Diseases of Bone—*Continued.*	No. in Series.	Pages.
c. Where the chief changes are in the form of enlargement . . .	171, 172	270, 271
d. Where the chief changes are in the form of necrosis		
(*a*) Where the dead piece has been in process of separation . .	173-185	271-275
(*b*) Where the dead piece has become loose, but has remained in position	186-194	275-278
(*c*) Sequestra, or dead pieces which have been separated . . .	195-201	278-280
4. Inflammation of bone produced by the Tubercle Bacillus—		
a. Where the chief changes are in the form of rarefaction	202-208	280-282
b. Where the chief changes are in the form of absorption and enlargement .	209-217	282-285
c. Where the chief changes are in the form of necrosis with absorption and enlargement	218-228	285-288
5. Where the Inflammation has been due to the combined action of the tubercle bacillus and of pus-forming organisms . .	229-236	289-292
Healed Tubercular Disease (*see* also under Tuberculosis of Joints and Spine, Series 7).	236	292
6. Inflammation of bone due to syphilis—		
A. The Skull—		
a. Where the chief changes are in the form of rarefaction		
(*a*) Where the process of rarefaction has been advancing . . .	237-245	292-296
(*b*) Where the process of rarefaction has been healing . . .	246-250	296-298
b. Where the chief changes are in the form of enlargement	251	298
c. Where the chief changes are in the form of necrosis	252-266	299-307
d. Sequestra due to syphilis after separation	266-281	308-314
B. The Skeleton—		
a. Where the chief changes are in the form of enlargement	282-337	314-330
7. Inflammation of bone due to syphilis complicated by sepsis	338-345	331-334

Series 6.—Diseases of Bone—*Continued.*	No. in Series.	Pages.
8. Combined effects of syphilis and rickets .	346, 347	334
9. Inflammation of bone due to actino-mycosis .	348	335
10. Inflammation of bone due to the mycetoma fungus	349-353	335-338
IV. Tumours of Bone.		
A. Cartilaginous tumours ranging from simple to malignant	354-372	338-350
B. Osseous and connective tissue tumours ranging from simple to malignant		
a. From the periosteum and bone . .	373-427	351-374
b. Central Tumours . . .	428-453	374-386
Sarcoma following fracture . .	454-462	386-390
Sarcoma invading bone . . .	463	390-392
C. Cancer (secondary) of bone . . .	464-476	392-396
Tumours of the lower jaw . . .	477-489	396-401
Tumours of the upper jaw and facial bones .	490-515	402-413
The Skull—		
I. Abnormalities in growth or development .	516-520	414, 415
II. Changes due to alterations in nutrition and growth—		
a. Old age	521, 522	415, 416
b. Local conditions affecting nutrition or growth	523-528	416, 417
c. Changes associated with alterations in nervous system—		
(1) Hydrocephalus . . .	529-536	418-420
(2) Idiocy	537	421
d. Changes due to obscure conditions .	538-547	421-423
Series 7.—Diseases of Joints.		
I. Abnormalities in growth or development .	1	424
II. Changes due to alterations in nutrition. .	2, 3	424, 425
III. Inflammation of Joints—		
1. Where the inflammation has been due to pus-forming organisms.		
a. Where the organisms have reached the joint through the circulation . .	4-8	425-428
b. Where the organisms have reached the joint through wounds . .	9-15	428-431
2. Where the inflammation has been caused by the Tubercle Bacillus.		

Series 7.—Diseases of Joints—*Continued.*

	No. in Series.	Pages.
Knee-Joint.		
a. Changes primarily in synovial membrane	16-63	431, 450
b. Changes primarily in the bone, or apparently so	64-68	450-452
c. Specimens illustrating spontaneous cure .	69-89	452-461
d. Results of operations for tubercular disease	90-95	461-463
Sacro-Iliac Joint .	96	463
Hip-Joint.		
a. Changes primarily or chiefly in synovial membrane	97-100	463-465
b. Changes primarily or chiefly in bone .	101-109	465-468
Ankle-Joint.		
a. Changes primarily or chiefly in synovial membrane	110-115	468-471
b. Changes primarily or chiefly in the bone .	116-120	471, 472
Joints of the Foot.		
a. Changes primarily or chiefly in the synovial membrane . . .	121	472
b. Changes primarily or chiefly in the bone.	122-130	473-476
Shoulder-Joint . .	131	476
Elbow-Joint.		
a. Changes primarily or chiefly in the synovial membrane	132-137	476-478
b. Changes primarily or chiefly in the bone.	138-141	478-481
c. Spontaneous cure after tubercular disease	143, 144	481
d. Result of operation for tubercular disease	145	481
Wrist-Joint.		
a. Changes primarily or chiefly in synovial membrane	146, 147	482
b. Changes primarily or chiefly in the bone.	148-152	482-484
c. Spontaneous cure after tubercular disease	153	484
d. Results of operations for tubercular disease	154, 155	485
3. Changes due to "arthritis deformans"—		
Knee-joint	156-165	485-489
Sacro-iliac-joint	166	489
Hip-joint	167-182	489-498
Shoulder-joint	183-190	498-502
Elbow-joint	191-197	503-506
Joints of the hand	198	506

Series 7.—Diseases of Joints—*Continued.*	No. in Series.	Pages.
4. Changes due to rheumatism	199-201	506, 507
5. Changes due to miscellaneous organisms—		
Gonococcus	202	507
Anchylosis from conditions the nature of which is obscure	203, 204	508
IV. New Growths involving Joints	205-207	508, 509
DISEASES OF THE SPINAL COLUMN—		
I. Abnormalities in Growth or Development	...	...
II. Changes produced by Conditions affecting Nutrition and Growth		
Lateral curvature	208-221	510-516
III. Inflammatory diseases—		
1. Where the inflammation is due to the action of pus-forming organisms	...	...
2. Where the inflammation is due to the action of the tubercle bacillus, *i.e.* "tubercular disease of the spine," "Pott's Disease," etc.		
A. Tubercular deposits without marked alteration of the curves	222-226	516-519
B. Where there has been distinct loss of substance leading to alteration of the curves	227-244	519-530
C. Spontaneous cure more or less complete	245-256	530-534
3. Where the inflammation is due to the poison of syphilis	257	534
4. "Arthritis deformans" affecting the spine	258-265	535, 536
IV. New Growths affecting the Spine	266	537, 538

DIVISION II.—MUSCLES AND TENDONS, SYNOVIAL SHEATHS, BURSÆ, FASCIÆ, AND CONNECTIVE TISSUE.

Series 8.—Structure and Arrangement, of Muscles and Tendons, Synovial Sheaths, Bursæ, Fasciæ, and Connective Tissue	1-11	539-541

Series 9.—Injuries and Diseases, of Muscles and Tendons, Synovial Sheaths, Bursæ, Fasciæ and Connective Tissue—

	No. in Series.	Pages.
MUSCLES AND TENDONS—		
Injuries	1	542
Diseases		
I. Abnormalities in Growth or Development	...	...
II. Changes produced by Conditions affecting Nutrition and Growth	...	...
Changes from affections of the nervous system	2, 3	542, 543
Changes from constitutional or other conditions more or less obscure	4-6	543, 544
III. Inflammatory Diseases—		
Abscess in muscle	7	544
IV. New Growths		
SYNOVIAL SHEATHS—		
Injuries	...	...
Diseases.		
I. Abnormalities, and II. Changes produced by Alterations in Nutrition and Growth	...	...
III. Inflammatory Diseases—		
1. Inflammation due to mechanical injury	...	...
2. Inflammation due to pus-forming organisms	...	...
3. Inflammation due to the tubercle bacillus	8-12	545, 546
BURSÆ—		
Injuries	...	...
Diseases.		
I. Abnormalities in Growth or Development	...	...
II. Changes produced by Alterations in Nutrition Growth	13, 14	547
III. Inflammatory Diseases—		
a. Where the inflammation has been due to mechanical injury	15	548
b. Where the inflammation has been due to pus-forming organisms		
c. Where the inflammation has been due to the tubercle bacillus	16-19	548, 549
IV. New Growth	20	549

Series 9.—Injuries and Diseases of Muscles, etc.—*Continued.*

	No. in Series.	Pages.
Fasciæ and Connective Tissue		
New Growths		
Fatty tumours	21-28	550-552
Fibrous tumours	29-32	552, 553
Fibro-sarcomatous tumours	33, 34	553, 554
Sarcomatous tumours	35-57	554-561
Recurrent fibroid tumours	58-65	562-566
Dissemination of sarcoma	66-68	567
Melanotic sarcomata	69-72	568
Chondro-sarcoma	73	569

DIVISION III.—THE LIMBS AS A WHOLE.

Series 10.—Development of the Limbs	1, 2	570
Series 11.—Injuries, Deformities, and Diseases of the Limbs as a Whole.		
Recent Injuries	1-3	571, 572
Results of Injuries	4-8	572, 573
Deformities of the Limbs		
Upper Limb.		
a. From deficiency in development	9-14	574, 575
b. From excess in development	15, 16	575, 576
Lower Limb.		
a. From deficiency in development	17-21	576, 577
b. From excess in development	22, 23	577, 578
Distortions in Position and Shape—		
Lower Limb.		
Talipes	24-40	578-582
Flat Foot	41-44	582, 583
Miscellaneous deformities	45-51	583-586
Upper Limb.		
Dupuytren's Contraction	52-56	586, 587
Miscellaneous deformities	57-59	588

Series 11.—Injuries, Deformities, and Diseases of the Limbs as a Whole—*Continued.*

	No. in Series.	Pages
GANGRENE—		
a. Dry senile gangrene . . .	60-69	588-591
b. Moist senile gangrene . . .	70-74	591-595
c. Other forms of gangrene . . .	75-81	595-597
STUMPS AFTER AMPUTATION—		
a. Anatomy	82-93	598-602
b. Pathology	94-99	602-604
c. Forms of Stumps	100-104	604-605



GENERAL PATHOLOGY.

—o—

SERIES I. GENERAL PATHOLOGY.

HYPERTROPHY.

PHYSIOLOGICAL, *i.e.* ASSOCIATED WITH INCREASED FUNCTION.

1. 1. Enlargement of Mamma in a Pregnant Woman.—Sections of two mammary glands—in spirit—to show the difference between the suckling and the non-suckling condition of that organ.

The larger portion is from the breast of a woman who died after an operation for extra-uterine pregnancy at full time. The smaller and more fibrous-looking portion is from the breast of a non-pregnant woman, aged about 26 years.

The enlargement in the pregnant mamma is due to the extra development of the acini forming the epithelial portion of the breast. This is perceptible not only on the surface, but also on the section, where the masses of epithelium show of an opaque yellow colour, surrounded by fibrous tissue. G. C. 3164 and 3101A.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1889.**

1. 2. Enlargement of Bone corresponding to Muscular Development.—Two specimens of the right human scapula; to illustrate the bony growth which corresponds to greater muscular development. G. C. 3136.

1. 3. Skeleton of a Mole (*Talpa vulgaris*).—The bones of the fore limb are developed greatly in excess of those of the hind limb. This difference corresponds to the greater use made of the fore limbs in burrowing. The development of muscle corresponds to that of the bones. G. C. 3137.

COMPENSATORY, *i.e.* FROM ARTIFICIALLY INCREASED DEMAND ON FUNCTION.

1. 4. Hypertrophy of Bladder Wall associated with old-standing Stricture of the Urethra.—Preparation of bladder, part of penis, and urethra. The bladder and prostatic portion of urethra are opened from above. The prostatic abscess, and the membranous and spongy parts of the urethra, are opened from below.

The patient, who had suffered from stricture for some years, had been in the habit of passing soft bougies on himself. Two days before his death he had sent for a surgeon, "who found him sinking" (probably from extravasation of urine).

Above the stricture, which was very narrow and plugged by a calculus, the urethral mucous membrane is dilated, ulcerated, and covered with "calculous" (phosphatic) deposit. The prostate has become an abscess cavity communicating with the urethra. A thick white rod shows where the urine had escaped into the cellular tissue of the penis and scrotum. Smaller white rods indicate the ureters. B. C. XIV. 1. M. 41.

1. 5. Hypertrophy of Fibula from Strain.—Plaster cast of a remarkable specimen of ununited fracture of the tibia which is in the Barclay Collection.

There has been an ununited fracture of the tibia, with a false joint. The fibula is much bent, and is at the same time greatly thickened, especially at the concavity, and at the convexity of the curve. These changes have evidently been the result of an increased strain on the bone, owing to the ununited fracture of the tibia. G. C. 3080.

1. 6. Thickening of the Capsular Ligament of the Hip-joint from Strain.—Upper end of the right femur of an old person,—in spirit—showing an ununited fracture of the neck, and changes consequent thereon. The soft parts are cleared off, excepting the ligamentous attachment round the hip.

The patient, a man aged 70 years, lived for fifteen months after receipt of an intra-capsular fracture of the neck of the femur.

The neck of the bone has been greatly absorbed, and the broken surfaces are smoothed and slightly hollowed out. Bands of newly-formed fibrous tissue unite the detached head to the capsule and to the neck. The thickening of the capsule is very manifest. G. C. 1478.

Presented by Prof. W. R. Turner and Alexander Watson, F.R.C.S.E., **1834.**

1. 7. Thickening of Epidermis from Pressure and Friction.—Longitudinal section of the left foot of a man,—in spirit—showing changes in the epithelium of the heel and ball of the toes.

Owing to a severe compound fracture of the Tibia in his youth, the patient had for 30 years been unable to walk on his heel. He had therefore borne his weight on the fore part of his foot.

The thickness of the epidermis below the balls of the toes is much greater than that below the heel. This condition is the reverse of what is found when the tread is normal.

G. C. 3130.

Presented by A. G. Miller, F.R.C.S.E., **1889.**

1. 8. Hypertrophy of Kidney.—This preparation consists of bladder, a sound kidney on one side, and a shrivelled one on the other, from an adult man,—in spirit. The bladder is laid open from above.

The patient died of some complaint unconnected with the kidneys, and their condition was only accidentally observed at the post-mortem examination.

The right kidney is not much larger than the prostate gland, and is calcareous and shrivelled, this most probably being

the result of tubercular disease, spontaneously cured. The left kidney is about twice the size of an ordinary one, but seems to be normal in structure. No doubt the enlargement has followed the increased demand upon its functions from the destruction of the other kidney. G. C. 3229.

Presented by HARVEY LITTLEJOHN, F.R.C.S.E., **1890.**

FROM IRRITATION OF VARIOUS KINDS.

1. 9. Periostitic Bone Formation near Septic Necrosis.—Lower portion of the stump of a femur, in which there has been necrosis—macerated and dried.

The patient, a girl æt. 15 years, had suffered amputation through the thigh some time before the specimen was obtained.

The lower end of the bone shows one distinct necrosis, with a smaller spicule of necrosis near it. The end of the medullary cavity has been closed in with bone, and a complete shell of periosteal bone surrounds the original shaft. This shell is thick at its lower end and along the anterior aspect of the femur. G. C. 3138.

1. 10. Thickening of Ribs from Empyema.—Section of two ribs, with a portion of a greatly thickened pleura, showing the above changes.

In consequence of prolonged empyema the pleura has been greatly thickened, and along with this a considerable growth of bone has taken place on the surface of the ribs next the pleura. G. C. 3074.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1889.**

For other similar changes in bone, see Series 6.

1. 11. Increased Growth of Hair over a Tubercular Joint.—Elliptical piece of skin removed from the front of the knee

of a child, with patella and part of diseased synovial membrane. When the joint was excised, the hairs on the surface were three or four times larger than those of the corresponding part on the opposite side. G. C. 3367.

Presented by A. G. MILLER, F.R.C.S.E., **1892.**

1. 12. Hypertrophy of Bone due to Mechanical Irritation.—Bones of the fore-limb of a fox, in which a wire loop has been embedded by the formation of new bone round it.

The specimen was obtained from the leg of an adult fox, which had been recently killed.

"The skin was perfectly healed up, and there was no mark externally, except a narrow line of yellow hair round the black part of the paw, showing where the skin had been cut by the wire. It is evident that the animal had got his foot entangled in a snare set for rabbits, that he had first drawn it so tight as to cut through the flesh to the bone, and then had succeeded in breaking the wire" (letter from donor).

From the comparative smoothness of the new bone, the condition must have been one of long standing. No doubt at first there must have been much inflammation, and that probably septic. G. C. 2400

Presented by T. MACPHERSON GRANT, Esq., **1854.**

FROM ALTERED NUTRITIVE CONDITIONS.

1. 13. Hypertrophy of Subcutaneous Fat on Anterior Abdominal Wall.—Section of the anterior abdominal wall of an elderly woman, near the linea alba.

The specimen shows a very large hypertrophy of subcutaneous fat, and slightly, also, of subperitoneal fat, while the skin and fascial structures remain quite thin. G. C. 3077.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1889.**

FROM UNKNOWN CAUSES.

1. 14. Congenital Hypertrophy of Finger.—Cast in glycerine

and gelatine, of a case of congenital hypertrophy of the hand and fore-arm of an infant girl aged 20 months showing enlargement of the middle finger.

The finger had been unusually large at birth, and had afterwards increased still more out of proportion to the others. It was amputated by Dr Joseph Bell the day after the cast was made.

The finger is about one-third longer and three or four times thicker than the others. The end of the finger is about the same girth as the infant's wrist. G. C. 2731.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1884.**

1. 15. Congenital Hypertrophy of Finger.—The amputated finger, of which the foregoing specimen is a cast.

The preparation is in spirit, and shows the enlargement to be chiefly due to increase in the subcutaneous fat. G. C. 2730.

Presented by JOSEPH BELL, F.R.C.S.E., **1884.**

FROM ABSENCE OF USUAL MODES OF REMOVAL.

1. 16. Hoof enlarged from Disuse.—Foot of a Red Deer—dried—showing an enlargement of the hoof and dew claws.

Owing to an injury of its leg, the animal had for several years been unable to put its foot to the ground, and in consequence the hoof had not been worn against the rocks and heather. G. C. 3078.

Presented by CHARLES M'HARDIE, *Gillie, Braemar,* **1889.**

1. 17. Overgrowth of the Teeth of a Rabbit.—Upper and lower jaws and forepart of the skull of an adult rabbit, with abnormal teeth.

The animal when shot was eating a leaf with its back teeth, and was well nourished.

The right lower incisor has been accidentally broken off after death. The left lower incisor projects forwards and curves

slightly upwards. Its upper and outer surface is worn by the inner surface of the upper incisor of the same side.

The right upper incisor has curved round upon itself, and by pressure has caused absorption of the left upper jaw, which it has in this way penetrated. An additional ill-developed incisor lies behind it.

The left upper incisor—though also overgrown—is shorter than its fellow, and has rubbed against the side of the left lower incisor. An additional incisor lies behind this tooth, and is shorter than the additional incisor of the right side.

The first right lower molar has had no exactly opposing tooth, and has, in its overgrowth, penetrated into the upper jaw. A certain amount of overgrowth is also seen in the first and second right upper molars, and in the first left lower molar.

G. C. 3115.

Presented by A. Allen, L.R.C.S., **1889.**

ATROPHY.

PHYSIOLOGICAL—FROM OLD AGE.

1. 18. Atrophy of Mamma in Old Age.—Sections of mammary glands from two women, one adult, the other aged,—in spirit.

The great contrast in size and thickness is at once apparent. G. C. 3101 and 3101*a*.

Presented by Charles W. Cathcart, **1889.**

For Atrophy of Bone, see Series 6.

FROM DIMINISHED FUNCTION.

1. 19. Atrophy of the Femur from Disease and Disuse.—Right femur of a young man, macerated and dried, showing the above changes.

The patient, for nine years before death, had been bedridden from spinal caries and psoas abscess. His age was said to have been 27 years, but his appearance after death was described as more like that of a

lad of 18 or 19; and the condition of the epiphyses points to a similar conclusion.

The bone is greatly attenuated in every way, and was unusually light. The compact tissue is, in many places, reduced to a mere shell. The articular surface of the head of the femur is partly absorbed and the bone opened out.

G. C. 2145.

Presented by Dr Gulland, **1840.**

1. 20. Atrophy from Disuse.—Photograph of the atrophied stump of a femur, in contrast with the strong bone of the opposite side. From Professor Humphrey's paper, *Journal of Anatomy and Physiology*, April 1889. G. C. 3535.

Presented by Charles W. Cathcart, F.R.C.S.E., **1893.**

1. 21. Atrophy of the Stump of a Femur after Amputation.—Section of the end of the stump of a femur after amputation, macerated.

The compact tissue is exceedingly light and thin, and has, in many parts, become cancellous. G. C. 3131.

1. 22. Muscle atrophied from Disuse.

Specimen required.

FROM VARIOUS CAUSES.

1. 23. Muscle atrophied from Joint Disease.

Specimen required.

1. 24. Muscle atrophied from Loss of Nerve Influence.—Preparation—in spirit—of the forepart of the right foot of a lad, with atrophy of muscle.

The patient had suffered for many years from an obscure form of paralysis of the lower limbs, and the foot was amputated on account of a perforating ulcer of the heel.

The muscles of the foot are all more or less atrophied. The extensor brevis digitorum, when fresh, was especially pale in colour. It is also diminished in bulk, and its tendons are reduced almost to threads. G. C. 3135.

Presented by A. G. Miller, F.R.C.S.E., 1890.

1. 25. Atrophy of Optic Nerve following Destruction of the Eyeball.—Preparation—in spirit—consisting of optic tracts, commissure, and nerves, with the eyeballs, one shrunken, showing changes in the nerve of the affected eyeball.

The appearance of the shrunken eyeball indicates long-standing destruction, and the optic nerve on the same side is much smaller than its fellow. The sheath of the nerve, in each case, has been dissected off at a corresponding point.

G. C. 3193.

1. 26. Atrophy from Excessive Use.

Specimen required.

1. 27. Atrophy from diminished Blood Supply.—Heart degenerated from calcification of coronary arteries.

Specimen required.

1. 28. Degeneration from Starvation.

Specimen required.

1. 29. Absorption of Vertebræ from Aneurismal Pressure.—Section of the bodies of three dorsal vertebræ, from a case of aneurism,—in spirit.

There is considerable hollowing out on the front of the vertebræ, and, as is usual in such cases, the bones have suffered more than the intervertebral discs, which stand out still comparatively unchanged. The substance of the bones seems quite normal beyond the absorbed portion. G. C. 3103.

1. 30. Absorption of Vertebræ from Pressure in Lateral Curvature.—Lower four cervical and upper nine dorsal vertebræ, from a case of lateral curvature—macerated.

In the concavity of the arch formed by the seventh, eighth, and ninth vertebræ on the left side, the bodies have been compressed, and are in consequence much less in depth there than on the other side, where there is a convexity. This is due to the greater compression which always exists upon the concavity of an arch, as when a piece of wood is bent upon itself. G. C. 1637.

Presented by P. Newbigging, F.R.C.S.E., **1835.**

1. 31. From Invasion by Malignant Growth.—Part of the left half of the lower jaw of an old person, in which epithelioma of the lip had invaded the bone.

Just behind the mental foramen the alveolar border of the bone has been invaded and its substance opened out and absorbed. G. C. 2888.

Presented by Professor Annandale, **1889.**

INFLAMMATION.

1. 32. Increased Vascularity of an Inflamed Part.—Cast in gelatine and glycerine of a left hand, showing a condition of onychia—probably septic and tubercular—in a child aged 9 or 10 years.

Several months before the cast was taken the nail had been bruised in a gate, and the finger had remained inflamed.

The redness and swelling round the end of the finger may be taken as illustrating an acute inflammation. It was, however, an acute exacerbation rather than a simple acute inflammation. The increased size of the nail indicates the previously congested condition of the parts, and may be taken as an instance of overgrowth from increased vascularity. G. C. 3125.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1889.**

1. 33. Increased Vascularity of an Inflamed Part; injected preparation.

Specimen required.

1. 34. Effusion of Lymph in Connective Tissues.

Specimen required.

1. 35. Effusion of Lymph on a Serous Surface.—Section of the heart of an elderly woman, who died of Pericarditis.

The surface of the heart is covered by a layer of soft recent lymph, which at places is peeled off, showing the smooth surface of the pericardium beneath. The surface of the lymph has the characteristic "bread-and-butter" appearance seen in recent cases of pericarditis. G. C. 3183.

Presented by T. BURN MURDOCH, M.B., C.M., **1890.**

1. 36. Effusion of Lymph on a Synovial Surface.

Specimen required.

1. 37. Effusion of Lymph on a Mucous Surface.—Trachea and part of larynx of a child, laid open from the back—in spirit—showing a false membrane.

The child died of croup.

There is a false membrane extending from the base of the epiglottis through the larynx to the trachea. In some places it is detached, and has left the mucous membrane below apparently little changed. G. C. 683.

Presented by Professor JAMES HAMILTON, **1824.**

1. 38. Lymph on Cutaneous Surface—Burn.

Specimen required.

1. 39. Organization of Effused Lymph.—Loop of bowel and mesentery, with organising lymph on the surface—injected.

Nine months before death (from strangulated hernia) patient had suffered from an attack of localised peritonitis from which he seemed to have completely recovered.

It is easy to see on the surface of the mesentery, and extending from that on to the intestine on both sides, strands of developing connective tissue, which have been injected at places, and which must have begun in recent lymph effused during the previous attack of peritonitis. G. C. 3123.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1889.**

1. 40. Organisation of Effused Lymph.—Small portion of the liver and part of the under-surface of diaphragm, with a long thin adhesion between them. The fibrous tissue seems now well formed, and has, no doubt, resulted from a slight peritonitis, which must have occurred some years before death. G. C. 3149.

1. 41. Thickening in Subcutaneous Tissue.—Portion of skin, with subcutaneous tissue, taken from the foot of a man, who had suffered from ulcer of the leg for many years.

The subcutaneous tissue is very dense and firm, from the

development in it of fibrous tissue, the proportion of fat being diminished. A small portion of subcutaneous tissue at the lower part of the specimen shows something more like the normal amount of fat and connective tissue. G. C. 3198.

Presented by A. G. MILLER, F.R.C.S.E., **1890.**

REPAIR OF INJURIES.

HEALING BY FIRST INTENTION.

1. 42. Skin Wound, in Process of Healing by First Intention.

Specimen required.

1. 43. Wound of Skin and of Peritoneum healed by First Intention.—Portion of the anterior abdominal wall, at and near the middle line, about 14 days after an abdominal operation.

The patient was a young man, upon whom laparotomy was performed for intestinal obstruction, caused by a band. The band was divided, and the obstruction successfully relieved. Two weeks afterwards, however, the obstruction returned, owing to adhesions forming at the seat of the previous obstruction. A second operation was performed, but the patient died a few hours afterwards.

The peritoneal wound has so completely healed that it is now impossible to say that any such wound had existed. The skin wound is also healed, but the recent epidermis has somewhat peeled off, and by its puckering shows where the wound was. G. C. 3320.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1891.**

1. 44. Repair in Muscle.

Specimen required.

1. 45. Repair in Tendon.

Specimen required.

For repair in Bone, *vide* Series 3.

1. 46. Repair in Artery.—Portion of a large artery, probably the femoral, laid open some days after a ligature,—in spirit.

The artery had been ligatured with silk, the ends of which are shown hanging down. At and near the point of ligature lymph has been effused, and extending up from the ligature there is a long narrow clot. The interior of the artery is marked by ridges, caused by changes in the middle coat.

G. C. 3152.

1. 47. Repair in Viscera.—

Specimen required.

HEALING BY SECOND INTENTION.

1. 48. Granulating Ulcer.—Gelatine and glycerine cast of an ulcer of the leg, healing by granulation.

The ulcer had been caused by an extensive burn. The healing process went on rapidly up to a point, but at the time the cast was taken the process had become sluggish, although still progressing.

The granulations are somewhat œdematous and raised above the level of the surrounding skin. The characteristics are otherwise those of a healing ulcer. G. C. 2883.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1889.

1. 49. Granulating Ulcer.—Finger and part of hand covered by granulations after a burn, artificially injected with gum and vermilion,—in spirit.

The patient, when drunk, had fallen into the fire. His hands had been so severely burned that both required to be amputated.

The irregular, granular appearance of the surface and its great vascularity are well brought out. The end of the finger has become gangrenous, and the necrosed end of the second phalanx is seen projecting through the soft parts.

The last two joints of the fingers had been quite gangrenous,

but over the first phalanx and metacarpal bone the subcutaneous tissue had been exposed, and has become covered with granulations. These are seen to be small irregular swellings, containing numerous blood-vessels, which have been freely injected. The section shows that the vascularity is much greater in the outer than in the inner parts. G. C. 3075.

Presented by JOHN DUNCAN, F.R.C.S.E., **1889.**

1. 50. Scar after Healing by Granulation.—Portion of skin which has formed the face of a stump, which had healed up by granulation,—in spirit.

The surface shows great puckering round the central scar and considerable condensation of the tissues in the deeper aspect, illustrating the large amount of fibrous tissue formed in healing by granulation as well as the contraction which accompanies the process. W. C. Q. 52.

1. 51. Contraction from Healing by Granulation.—Plaster cast of neck and face of a man (Broggan), showing the contraction which attended the healing of an extensive burn, by granulation.

The patient had been burned in childhood. The chin is brought down upon the sternum, and the lower lip has been pulled away from the mouth. Owing to the loss of support usually given by the lower lip to the lower incisor teeth, these have been pushed forward by the pressure of the tongue from within. G. C. 3166.

From a Cast presented by JOHN MACKINTOSH, F.R.C.S.E., **1834.**

For other illustrations of healing by granulation, see skin series.

DEGENERATIONS AND INFILTRATIONS.

1. 52. Fatty Degeneration of Muscle.—Muscle from a patient who suffered from paralysis.

The form of the muscle is still preserved, but the muscular substance is entirely replaced by fat. B.C. IV. 1. M. 3.

For fatty degeneration of gland (kidneys), see genito-urinary series.

1. 53. Fatty Infiltration.—Section of Fatty Liver,—in spirit.

G. C. 2524.

Presented by R. BLAIR CUNYNGHAME, F.R.C.S.E., **1879.**

1. 54. Mucoid Degeneration.

Specimen required.

1. 55. Colloid Degeneration.—Several coils of intestine injected and in spirit, matted together by "Colloid Degeneration" (Colloid Cancer?).

The soft colloid material is well shown projecting from the surface of the mass which holds the coil of intestines together. It is open to question whether this is a form of degeneration or of tumour growth.

G. C. 2479.

1. 56. Amyloid Degeneration.—A portion of a human liver which has undergone the waxy or amyloid degeneration to an extreme degree.

The portions of amyloid material in the liver are well shown, forming a pattern with the more opaque remains of the liver structure.

G. C. 2516.

Presented by R. BLAIR CUNYNGHAME, F.R.C.S.E., **1879.**

1. 57. Caseation in a Syphilitic Deposit in the Testicle.—

Portion of a testicle in which a caseating syphilitic deposit had formed—injected and in spirit.

The yellow caseating substance is shown in strong relief from the injected tissue round about it, and it may be noted that the vascularity is greatest in the neighbourhood of the caseation. G. C. 3154.

1. 58. Calcareous Infiltration.—Portion of two large arteries in which the middle coats have been infiltrated with lime salts —cleaned and dried.

The calcareous plates stand out from the surrounding parts, and it may be seen in many places that the calcareous deposit follows the direction of the circular fibres of the middle coat.

G. C. 3155.

1. 59. Pigmentary Infiltration.—Portion of lung from a case of anthracosis.

The excessive deposit of carbon in the lung has caused many parts of it to be as black as soot. Pleurisy has been set up, and the costal and pulmonary surfaces of the pleura are closely matted together. G. C. 3153.

1. 60. Pigmentation from Chronic Congestion.—Portion of skin from the front of a tubercular knee, which had been frequently blistered.

The skin was removed in excision of the joint, and shows a deep pigmentation, such as results from frequent congestions from any cause. G. C. 3340.

Presented by A. G. Miller, F.R.C.S.E., 1892.

For pigmentation in new growths, see Melanotic Sarcomata, series 9.
For gangrene, see series 11.
For forms of new growth, see affections of different textures and organs.

SPECIAL ANATOMY AND PATHOLOGY.

—o—

CLASS I. THE SKELETON AND ORGANS OF LOCOMOTION.

DIVISION I. BONES AND JOINTS.

SERIES 2. STRUCTURE AND DEVELOPMENT OF BONE.

2. 1. Inorganic Portion of Bone.—Section of upper end of the left femur of an adult, from which the animal part of the bone has been removed by burning. The lime salts only are left.

The inorganic portion maintains the form of the original bone down to the most minute details. G. C. 3536.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1890.**

2. 2. Organic Portion of Bone.—Radius—in spirit—from which the calcareous matter has been removed by steeping in acid.

The animal matter which remains is extremely flexible, and the bone has been bent upon itself. G. C. 3537.

2. 3. Organic Portion of Bone.—Rib—in spirit—from the anterior part of which the calcareous matter has been removed

by steeping in acid. The animal matter, which alone remains in the steeped portion, is so flexible that this part of the bone has been easily tied in a knot. B. C. 1. N. 7.

2. 4. Cancellous and Compact Tissue.—A small section of a bone—macerated and dried—to show the compact shell and cancelli in the interior. B. C. 1. N. 9.

2. 5. Cancellous Tissue.—A section of the lower end of the tibia—macerated and in spirit—to show the arrangement of the cancelli. W. C. F. 107.

2. 6. Arrangement of Cancellous Plates in the Head and Neck of Femur and Os Innominatum.—Section of the upper part of the femur and os innominatum—macerated and dried—to show the cancelli.

It will be seen that at the upper end the lamellæ form the figure of a Gothic arch, and that they radiate from the head towards the great trochanter on the one hand and towards the under surface of the neck on the other.

W. C. F. 9.

2. 7. Arrangement of Cancelli in the Head of a Tibia.—Section of a tibia—macerated and dried to show the cancelli. A line of bone running across the section shows the point of union of the epiphysis. W. C. F. 11.

2. 8. Cancellous and Compact Tissue of Humerus.—Vertical section of a right humerus, apparently of an elderly person—macerated and dried—to show the internal structure of the bone. G. C. 2135.

Presented by W. Campbell, F.R.C.S.E.

2. 9. Cancellous Tissue in the Lower End of a Femur.—Vertical sections of the lower end of a right femur—macerated and dried—to show the arrangement of the cancelli.

W. C. F. 14.

PROCESS OF DEVELOPMENT IN GENERAL.

2. 10. Ossification in Cartilage.—A portion of the cartilage of a young elephant, beginning to ossify (apparently injected with mercury to show the blood-vessels). B. C. 1. N. 18.

2. 11. Ossification at Knee Joint.—Section of the bones forming the knee-joint of an infant at birth—injected and in spirit—showing the process of ossification.

The central nuclei of bone in the epiphysial cartilage of the femur and tibia are well seen. The patella remains quite cartilaginous. B. C. 1. N. 23.

2. 12. Ossification of the Lower End of Femur.—Sections of the lower end of the femur of a child—injected with vermilion and in spirit—to show the cartilage that remains between the shaft and the epiphysis until the ossification is complete.

The channels for blood-vessels are seen in the ossifying cartilage. B. C. 1. N. 28.

2. 13. Ossification of Astragalus.—Right astragalus of a child—minutely injected and in spirit.

The ossification is now complete, and the cartilage, which is now only articular, has not been at all penetrated by the injection. B. C. 1. N. 26.

2. 14. Ossification of Bone.—Section of the femur and tibia—in spirit—from a young pig which had been fed on madder for six weeks before it was killed.

The last-formed portions of bone are stained pink. Thus the new deposit is seen at the epiphysial end of shafts, slightly under the periosteum, and just perceptibly below the articular cartilage of the femur and tibia at the knee.

B. C. 1. N. 29.

2. 15. Growth of Bone.—Section of the femur of a young pig which had been fed on madder—macerated and dried.

On the outer aspect a faint pinkish stain is seen over the whole bone. In the interior the centre of the shaft is white, but the epiphysial ends are slightly stained, as are also the interior of the epiphyses, only less so. G. C. 2659.

2. 16. Growth of Bone.—Section of head of a young pig which had been fed on madder. The soft parts are cleared away, except near the nose.

The madder colouring has faded, but a pinkish tint is still seen in many places. G. C. 2749.

2. 17. Ossification in Membrane.—Parietal bone of an infant—injected with vermilion and in spirit—showing the bony spicules and blood-vessels radiating out from a centre of ossification. W. C. F. 18.

DEVELOPMENT IN PARTICULAR.

2. 18. Development of Skeleton.—Skeleton of human fœtus, between the third and fourth month—dried—to show the amount of bone laid down at this period. B. C. 1. N. 86.

2. 19. Development of Skeleton.—Skeleton of human fœtus about the fourth month—dried—showing the amount of bone laid down at this period. The sockets of the teeth are now perceptible. B. C. 1. N. 87.

2. 20. Development of Skeleton.—Skeleton—in spirit—of human fœtus, about fifth month. The periosteum is left on the bones, and the cartilaginous ends have the future shape of the bones.

The relative proportion of bone to cartilage and membrane is not easily seen in this method of preparation.

B. C. 1. N. 88.

2. 21. Development of Skeleton.—Skeleton of a fœtus, about the fifth month—macerated and mounted on cardboard in separate pieces—showing the relative amount of bone laid down at this period. The right tibia and the bones of both feet are wanting.

G. C. 3548.

2. 22. Development of Skeleton.—Skeleton of human fœtus about the sixth month—dried—showing the amount of bone laid down at this period. B. C. 1. N. 89.

2. 23. Development of Skull.—Skull of a fœtus, about the fifth month (brain and soft parts removed)—rendered transparent by being mounted in turpentine, to show the development of bones in the membrane. B. C. 1. N. 66.

2. 24. Development of Skull.—Skull of a fœtus, probably between the sixth and seventh months. The soft parts and

brain are removed from the preparation, which is mounted in turpentine, and shows the vascularity of the developing bone.
B. C. 1. N. 68.

2. 25. Development of Skull.—Skull of a fœtus, between the fifth and sixth months—injected with vermilion and in spirit.

The preparation exhibits a shrivelling of the membrane, which brings out more strongly the bone which has been formed. B. C. 1. N. 67.

2. 26. Development of Frontal Bone.—Two halves of the frontal bone of a fœtus, about the second month—dried—showing the development of the supraciliary ridges. B. C. 1. N. 60.

2. 27. Development of Frontal Bone.—Two halves of the frontal bone of a fœtus, between the third and fourth month—dried—showing the development of the frontal eminences and supraciliary ridges. B. C. 1. N. 61.

2. 28. Development of Frontal Bone.—Right half of the frontal bone of a fœtus, between the fourth and fifth month—dried—showing the development of the frontal eminence, supraciliary ridges, and orbital plate. B. C. 1. N. 62.

2. 29. Development of Parietal Bones.—Parietal bones of a fœtus about the second month, showing the centres of ossification. B. C. 1. N. 59.

2. 30. Development of Parietal Bones.—Parietal bones of a

fœtus between the sixth and seventh month—dried—showing its development. B. C. 1. N. 63.

2. 31. Development of Parietal Bones.—Parietal bones of a fœtus between the seventh and eighth month—injected with vermilion and in spirit.

The preparation shows the blood-vessels and bony spicules radiating out from the centres of ossification. B. C. 1. N. 64.

2. 32. Development of Parietal Bones.—Parietal bones of a fœtus about the eighth month, showing the extent of development reached at that stage. B. C. 1. N. 65.

2. 33. Development of the Skull and Face.—Bones of the head of an infant at birth—macerated and mounted separately—showing the relative proportion of bone formed at birth. Prepared by Vasseur, Paris. G. C. 3547.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

2. 34. Development of Spine.—The spine of a fœtus, said to be about the fourth month—in spirit—apparently for the most part cartilaginous. B. C. 1. N. 71.

2. 35. Development of Spine.—The spine of a fœtus, said to have been about the fourth month—in turpentine.

Centres are seen in the mid-dorsal and mid-lumbar bodies and in the upper sacral bodies, as well as in the laminæ and pedicles of most of the vertebræ. B. C. 1. N. 72.

2. 36. Development of Spine.—The spine of an infant at birth—injected, and in spirit—with the soft parts cleaned away but the cartilage left.

The tips of the transverse and spinous process, as well as portions of the bodies and the lateral masses of the sacrum, are still cartilaginous. B. C. 1. N. 76.

2. 37. Development of Spine.—Bony portion of spine and ribs of an infant at birth—macerated and mounted on card-board—showing the bony centres. Prepared by Vasseur, Paris. G. C. 3544.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

2. 38. Development of Spine.—Dorsal vertebræ of a child, one year old—injected, the periosteum removed, and in spirit.

The tips of the spinous and transverse processes are still cartilaginous, and the epiphyses of the bodies have not yet united with the central masses nor the latter with the centres for the pedicles. B. C. 1. N. 73.

2. 39. Development of Spine.—Bodies of ten dorsal vertebræ—said to be from a child one year old. B. C. 1. N. 75.

2. 40. Ossification of Vertebræ.—Adult dorsal vertebra—macerated, and sawn up—so as to show the portions which ossify separately. Prepared by Vasseur, Paris. G. C. 3550.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

2. 41. Development of Thorax.—Skeleton of the thorax of a very young fœtus, "under three months." B. C. 1. N. 70.

2. 42. Development of Thorax.—Cervical and upper ten dorsal vertebræ, with corresponding ribs and sternum, from a fœtus, probably about the fifth month—injected, cleaned, and in spirit.

The shape of the parts is exceedingly well seen.

B. C. 1. N. 78.

2. 43. Development of Sternum.—Sternum of a fœtus, about the fourth month—in turpentine and injected. Three points of ossification are seen. B. C. 1. N. 80.

2. 44. Development of Sternum.—Sternum of a fœtus of about the eighth or ninth month—injected and in turpentine.

Three large and three smaller points of ossification are now seen. B. C. 1. N. 81.

2. 45. Development of Sternum.—Sternum and costal cartilages of a child at birth—in spirit—showing four centres of ossification in the former. B. C. 1. N. 82.

2. 46. Ossification in Sternum.—Sternum in which the ossification is nearly complete, but still showing the double centres in the third, fourth, and fifth pieces. B. C. 1. N. 84.

2. 47. Development of the Bones of Upper Limbs.—Bones of the arms of a fœtus under the third month—prepared and dried, so as to show the amount of ossification at this time.

B. C. 1. N. 90.

2. 48. Development of Upper Limb.—Skeleton of the arm of a fœtus between third and fourth month—in spirit.

B. C. 1. N. 91.

2. 49. Development of Upper Limb.—Skeleton of right upper limb of an infant at birth—macerated—showing the relative amount of each bone developed at this stage. Prepared by Vasseur, Paris. G. C. 3545.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

2. 50. Development of Scapula.—Scapula of an infant—injected and in turpentine—showing the bony and cartilaginous portions.

There is an epiphysis in the coracoid process, but no bone is as yet deposited in the cartilaginous epiphysis at the glenoid cavity, the acromion process, and the vertebral border.

B. C. 1. N. 55.

2. 51. Development of Scapula.—Scapula of a young person, said to have been 15 years of age—macerated and dried.

The coracoid process has not yet united, and the cartilaginous extremities of the acromion process, glenoid cavity, and vertebral border have disappeared in the process of maceration.

G. C. 3543.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

2. 52. Ossification of Humerus.—A section of the humerus in early life—injected and in turpentine—to show the process of ossification in it.

The cartilage has shrivelled, but one small centre of ossification is shown for the head and another for the greater tuberosity. The lower end of the bone is as yet entirely cartilaginous. B. C. 1. N. 19.

2. 53. Ossification at Elbow.—Preparation of both elbows of a child at birth—injected with vermilion and in spirit. Ossification has not yet begun in the cartilaginous epiphyses.

B. C. 1. N. 37.

2. 54. Ossification of Humerus.—Humerus—injected with vermilion and in turpentine—from a child 2 or 3 years old.

In the upper epiphyses two centres of ossification are seen; in the lower epiphyses as yet only one. The cartilaginous portions of the epiphyses at either end are shrunken, but they are translucent and show the blood-vessels penetrating into them.

B. C. 1. N. 36.

2. 55. Ossification of Humerus.—Humerus of a child—macerated and dried—showing the position of the various epiphyses.

The epiphyses at the upper end have united into one, which, however, has not yet united to the shaft. At the lower end, there is a separate epiphysis for the outer condyle, for the capitellum and adjacent part of the trochlea, and for the remainder of the trochlea, but that for the inner condyle has been lost in the process of maceration.

G. C. 3528.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

2. 56. Ossification at the Head of Humerus.—Sections of the upper end of the right humerus of a patient aged 20 years—cleaned and in spirit—showing the epiphysial ossification nearly completed.

The line of the epiphysial junction is seen to run irregularly between the anatomical and surgical necks. In this specimen the union is complete below the head, but incomplete at the tuberosities.

B. C. 1. N. 54.

2. 57. Ossification in the Bones of the Forearm.—Bones of the right forearm of a young person, said to be 15 years old—macerated and dried—to show the epiphyses.

In the radius at the lower end an epiphysis forms the carpal articular surface and the styloid process, and at the upper end a small plate of bone (lost in this specimen) forms the articular surface with the humerus. On the ulna an epiphysis forms the styloid process and the lower articular surface, while at the upper end there is a small epiphysis for the olecrannon.

G. C. 3539.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

2. 58. Development of Forearm.—Ulna of a child—injected and in spirit.

The epiphyses are shown as in the previous specimen.

2. 59. Development of Hand.—Skeleton of the hand of a fœtus between the fifth and sixth month—in turpentine.

There is only one point of ossification in the carpus. The metacarpal bones and all the phalanges of the thumb and first three fingers show centres of ossification, but in the little finger there is a centre of ossification in the first phalanx only.

B. C. 1. N. 97.

2. 60. Development of Hand.—Skeleton of the hand and part of the forearm of a fœtus about the sixth month—injected and in turpentine.

One centre of ossification is seen in the carpus and also in the metacarpal bone and phalanges of the thumb and all the fingers.

B. C. 1. N. 95.

2. 61. Development of Hand.—Skeleton of the hand and part

of forearm of a fœtus between the sixth and seventh months —in turpentine.

There are no ossific centres in the carpus yet, but those in the metacarpal bones and phalanges are well developed.

B. C. 1. N. 98.

2. 62. Development of Hand.—Skeleton of the hand and forearm, said to be of a child at birth—in turpentine. No ossific centres in the carpus are formed as yet. B. C. 1. N. 96.

2. 63. Development of Hand.—Skeleton of the hand and forearm of a child at full time—injected and in turpentine.

There are two small centres in the position of the unciform bone, but the remainder of the carpal bones are still cartilaginous. B. C. 1. N. 100.

2. 64. Development of Hand.—Skeleton of the hand of a child four months old. Centres of ossification are seen in the os magnum and unciform bone. B. C. 1. N. 101.

2. 65. Development of Hand.—Skeleton of the right hand of a child, of ten or twelve months—injected and in turpentine—showing the advancing ossification of the carpus.

Centres in the semi-lunar and cuneiform bones as well as in the os magnum and unciform bone, are now seen, in addition to those in the metacarpal bones and phalanges.

B. C. 1. N. 102.

2. 66. Development of Hand.—Skeleton of the left hand of a child—injected and in turpentine.

The specimen seems to be of the same age as the last, and is probably from the same subject. It is entered in the Bell Catalogue as from a child between three and four years of age.

B. C. 1. N. 103.

2. 67. Structure of the Fingers.—Section of the bones of the thumb—injected with vermilion and preserved in turpentine—to show the relative vascularity of the parts about the joints.

B. C. 1. N. 41.

2. 68. Structure of the Fingers.—Section of the fore and middle fingers—injected—to show the relative vascularity of skin, tendon, bone, and adjacent parts. B. C. 1. N. 39.

2. 69. Development of the Pelvis.—Bones of pelvis of a child "two years old"—injected and in spirit—showing the process of ossification.

It seems as if the age of the child had been less than two years. B. C. 1. N. 79.

2. 70. Development of Os Innominatum.—Os innominatum of a child—macerated and dried—to show the progress of ossification in the main centres, also the cartilaginous epiphyses. B. C. 1. N. 57.

2. 71. Development of Lower Limb.—Skeleton of the lower limb of a fœtus under three months.

Although the length of the whole limb is only half an inch, the form of the various parts is well seen.

B. C. 1. N. 104.

2. 72. Development of Lower Limb.—Skeleton of lower right limb of an infant at birth—macerated—showing the relative amount of each bone developed at this stage. Prepared by Vasseur, Paris. G. C. 3546.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

2. 73. Development of Femur.—Femur of a child eight months old—cleaned and in spirit—to show the bony character of the shaft and cartilaginous extremities. B. C. 1. N. 48.

2. 74. Ossification of the Upper End of Femur.—Section of the upper end of the femur of a child—in turpentine—showing the epiphysis for the head, and a section of that for the great trochanter. B. C. 1. N. 52.

2. 75. Ossification of the Upper End of Femur.—Upper end of the right femur of a young person, said to be about fifteen years of age—macerated and dried.

The epiphysis for the head and great trochanter are well shown. That for the small trochanter was lost in maceration. Prepared by Vasseur, Paris. G. C. 3540.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

2. 76. Ossification at Knee-Joint.—The epiphyses of the knee-joint at birth—injected with vermilion and in spirit—showing their great vascularity.

The epiphysial centre, which is usually at the lower end of the femur at that period, is not well brought out. B. C. 1. N. 38.

2. 77. Ossification of the Lower End of Femur.—Section of the lower part of the femur (at birth)—injected with vermilion and in spirit.

The centre of ossification within the cartilage is left projecting, and is seen to be very vascular. Blood-vessels are seen at one or two places in the substance of the cartilage. The presence of this centre at birth is often used medico-legally as a test of full-term delivery. B. C. 1. N. 21.

2. 78. Ossification of the Lower End of Femur.—Lower end of the right femur of a person about 15 years old—macerated and dried—showing the epiphyses well formed, but not yet united to the shaft.

No. 2. 75 is the upper end of the femur of which this is the lower end. G. C. 3541.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

2. 79. Development of Patella.—The patella of a child at birth—in spirit.

It is entirely cartilaginous. B. C. 1. N. 117.

2. 80. Development of Patella.—The patella of a child, nine months old—injected and in turpentine.

It is still cartilaginous. B. C. 1. N. 118.

2. 81. Development of Patella.—The patella of a child, sixteen months old—injected and in spirit.

It is still cartilaginous. B. C. 1. N. 119.

2. 82. Development of Patella.—The patellæ of a child two years old—in turpentine.

They are still cartilaginous. B. C. 1. N. 120.

2. 83. **Development of Patella.**—Patellæ in process of ossification—injected and in turpentine.

These specimens are similar to the last. B. C. 1. N. 122.

2. 84. **Development of Patella.**—Patellæ of a child seven years old—in turpentine.

The ossific centres are large, but some cartilage still remains. B. C. 1. N. 121.

2. 85. **Development of Patella.**—Patella of a child nine years old—in spirit.

A bursa is seen beneath the ligamentum patellæ.

B. C. 1. N. 123.

2. 86. **Development of Patella.**—Patella of a person sixteen years old—in turpentine.

Considerable cartilage still remains. B. C. 1. N. 124.

2. 87. **Development of Patella.**—Section of an injected patella from a person twenty years old—in turpentine.

The bone is now nearly perfect. B. C. 1. N. 125.

2. 88. **Development of Patella.**—Patellæ of a man advanced in life—in turpentine.

The bones are now complete. B. C. 1. N. 126.

2. 89. **Ossification of Tibia.**—Section of the tibia—injected with vermilion—in spirit—the vessels running through the epiphysial

cartilage, to deposit the bone in the centre, are beautifully seen.

There is a small centre of ossification at the head, but the lower part of the bone is as yet entirely cartilaginous. The bony centre in the upper epiphysis, as well as the epiphysial end of the shaft, are seen to be extremely vascular.

B. C. 1. N. 22.

2. 90. Ossification of Tibia.—Section of the tibia of a child, injected with vermilion—in turpentine—showing the vascularity of the bone and epiphysis. B. C. 1. N. 31.

2. 91. Development of Tibia and Fibula.—Tibia and fibula of a child—injected and in spirit—showing the periosteum and cartilaginous extremities. B. C. 1. N. 46.

2. 92. Ossification of Tibia.—Tibia of a child—injected with vermilion, and decalcified to show the vascularity of the forming bone—in spirit. B. C. 1. N. 34.

2. 93. Ossification of Tibia.—Lower end of a tibia, of the same age as the last—injected and in spirit—showing the epiphyses.

B. C. 1. N. 69.

2. 94. Ossification of Tibia and Fibula.—Right tibia and fibula from the same child as Nos. 2. 75 and 2. 78 were taken.

G. C. 3542.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

2. 95. Development of Foot.—Right foot of a fœtus, between

the fourth and fifth month, showing the epiphyses in the metatarsal bones, phalanges of the great toe, and first phalanges of the other toes. B. C. 1. N. 105.

2. 96. Development of Foot.—Skeleton of lower part of right leg and foot of a fœtus, between eighth and ninth month.

The specimen shows centres in the metatarsal bone and first phalanges of all the toes. Centres are also seen in the second and third phalanges of all the toes except the fourth and fifth. B. C. 1. N. 106.

2. 97. Development of Foot.—Skeleton of the foot of a fœtus at birth—injected and in turpentine.

There is a centre for the os calcis and apparently one for the astragalus. B. C. 1. N. 108.

2. 98. Development of Foot.—Skeleton of the foot of a child, probably a few months after birth—in turpentine.

There is a large centre for the os calcis and a smaller one, which was probably for the astragalus, but which has now been displaced. B. C. 1. N. 110.

2. 99. Development of Foot.—Skeleton of the left foot of a child three or four years old—injected and in turpentine.

There is no ossification yet in the scaphoid or middle cuneiform bone. B. C. 1. N. 111.

2. 100. Development of Foot.—Skeleton of the foot of a child five years old—injected and in turpentine.

No ossification yet appears in the scaphoid or middle

cuneiform bone, and only a very small centre in the inner cuneiform bone. B. C. 1. N. 112.

2. 101. Development of Foot.—Skeleton of the foot of a child, probably about six years old—injected and in turpentine.

The scaphoid is still cartilaginous and the centres in the middle and internal cuneiform bones are exceedingly small.

B. C. 1. N. 113.

2. 102. Development of Foot.—Skeleton of the foot of a child, about eight or nine years old. The ossific centres in the inner and middle cuneiform and scaphoid bones are still relatively very small. B. C. 1. N. 115.

2. 103. Development of Foot.—Tarsus and metatarsus from a young person, about fifteen years of age—macerated to show the epiphyses in the os calcis and the heads of the metatarsal bones. Prepared by Vasseur, Paris. G. C. 3549.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

2. 104. Ossification of the Tarsal Bones.—Section of the bones of the tarsus of an infant, probably about birth—injected and in spirit—to show the centres of ossification beginning in the cartilage. B. C. 1. N. 25.

2. 105. Structure of Foot.—Transverse section of the tarsal arch of an adult—injected and in turpentine—to show the relative vascularity of the parts. B. C. 1. N. 44.

2. 106. Structure of Foot.—Section of the bones forming the

tarsus of an adult—injected and in turpentine, to show their arrangement. B. C. 1. N. 127.

2. 107. Structure of Foot.—Section of the heads of the metatarsal bones of an adult—injected and in turpentine.
B. C. 1. N. 128.

2. 108. Structure of Great Toe.—Section of the great toe of an adult—injected and in turpentine—to show the relative position of the sesamoid bones. B. C. 1. N. 129.

2. 109. Structure of Toe.—Section of the bones of the second toe of an adult—injected, and mounted in spirit—to show the relative vascularity of the parts and the arrangement of the articular surfaces. B. C. 1. N. 42.

COMPARATIVE ANATOMY.

2. 110. Development of Bone.—Section of the bones of a young quadruped—injected with vermilion and in turpentine—to show the high vascularity of the cancellous bone and periosteum.
B. C. 1. N. 30.

2. 111. Development of Bone.—Bones of a young quadruped—injected—to show the vascularity of the periosteum.
B. C. 1. N. 47.

2. 112. Cuttle Bone.—Cuttle-fish bone, partly destroyed by acid so as to show its membranes. B. C. 1. N. 133.

SERIES 3. INJURIES OF BONE AND CARTILAGE.

For Varieties of Fracture, *see below Nos.* 8, 18, 36, 48, 61, 83, 127, 187, 211, 212, 230, 274, 278, 287, 304.

,, Repair of Fracture, *see below Nos.* 46, 199, 275, 213 to 217, 391, 392.

,, Mal-union of Fracture, *see below Nos.* 117, 118, 124, 129, 223, 238.

,, Non-union of Fracture, *see below Nos.* 114, 182, 183, 252.

FRACTURES OF THE SKULL.

FISSURED FRACTURES.

3. 1. Fissured Fracture of both Parietal Bones.—Calvarium of an elderly person—macerated—showing the above fracture, and two trephine openings on the right side.

The patient had fallen from a great height. When taken to the surgeon he was insensible, and had an extensive effusion of blood over the right parietal bone. When the bone was exposed by an incision a fissure was seen, and first the posterior, then the anterior trephine hole was made in the hope of relieving pressure from blood clot. However, "the patient continued to snort in a state of complete insensibility, and died."

On the right side the fissures radiate in three directions from about the centre of the parietal eminence. The widest fissure runs down to the centre of the squamous suture. Another fissure, more on the outer than on the inner table, runs forward to the coronal suture, while the third, running backwards over the trephine openings, does not extend beyond the posterior one.

On the left side a fissure runs from above the parietal eminence towards the posterior inferior angle of the bone.

B. C. 1. 2. M. 1.

3. 2. Fissured Fracture of the Frontal and Parietal

Bones.—Calvarium of an elderly person—macerated—to show the fissured fracture as above.

The injury was inflicted on the upper part of the cranium.

On the right side the fissure has traversed the coronal suture and has then passed into the parietal bone.

On the left side on the posterior part of the frontal bone there is a fissure more extensive on the inner than on the outer table. B. C. 1. 2. M. 3.

3. 3. Fracture of Calvarium with Sub-dural Hæmorrhage.—Calvarium of an old person—macerated—with dura mater and blood clot between it and the bone modelled in position, in wax.

The bone was trephined and the greater part of the coagulum removed with a teaspoon, but the patient died of concussion.

Several fissures cross the course of the right middle meningeal artery. It must have been ruptured.

B. C. 1. 2. M. 5.

3. 4. Fissured Fracture of the Skull, associated with Contre-coup.—Skull-cap—macerated—in which portions of the frontal and left parietal bones have been split. They are wired in position.

The patient was working at the Forth Bridge, and fell from a height, striking his left temple. He was brought to the Infirmary, where he shortly afterwards died.

At the post-mortem examination there was scarcely any injury to the brain on the left side, but on the right side there was great laceration, by contre-coup, of the temporo-sphenoidal and frontal lobes, and from this he must have died.

The fractures were merely fissures until the calvarium was sawn off. G. C. 2832.

Presented by Professor T. ANNANDALE.

3. 5. Brain injured by Contre-coup.—Lower portion of the

brain from the foregoing case—in spirit—showing extensive laceration of the right temporo-sphenoidal and frontal lobes.

As noted in the previous specimen, the injury was received on the left side. This is therefore an illustration of injury to the brain by contre-coup. The under and lateral surfaces of the temporo-sphenoidal and frontal lobes are severely lacerated on the right side, while on the left side they are apparently unharmed, except for slight superficial hæmorrhages on the frontal lobe, below the points where the bone was broken.

G. C. 2831.

Presented by Professor T. ANNANDALE.

3. 6. **Longitudinal Fissure of Calvarium.**— Calvarium — macerated—from an elderly person, showing longitudinal fracture through the right parietal and frontal bones.

The symptoms were obscure, and the fracture was not recognised during life.

Apparently another fracture below the fissure has been present, but the loose piece has not been preserved.

G. C. 1130.

Presented by Sir GEORGE BALLINGALL.

3. 7. **Fracture of the Base of the Skull.**—Skull—macerated —with a quadrant removed from the vault to show the above.

The fissure, beginning in the left parietal bone, meets the lambdoidal suture, and then continues into the articulation between the occipital and temporal bones on its way to the base. The body of the sphenoid has been fissured right across, and the sutures at the base of the skull generally are loosened.

G. C. 3392.

3. 8. **Fracture of the Base of the Skull.**—Skull of an old

person, in which a fissure beginning on each side near the vertex extends downwards into the base, where the two meet.

The fissure on the right side after splitting the parietal bone has loosened the squamous portion of the temporal bone from its articulations, and then has passed across the great wing and body of the sphenoid. The joint between the zygoma and the malar bone has been forced open. The main fissure on the left side, after running through the front of the parietal bone, has opened up the suture between the great wing of the sphenoid and squamous part of the temporal bone before passing to the base. A second fissure on this side extends through the squamous portion of the temporal bone, and after passing through the root of the zygoma meets the first one in the glasserian fissure. The left condyle of the occipital bone has been broken off. G. C. 3393.

3. 9. Fracture of the Base of the Skull.—Skull of a very old person—macerated—A quadrant has been removed from the vault to show the above.

The fracture begins at the squamous suture on the right side as a fissure which passes through the roof of the tympanum, crosses irregularly the body of the sphenoid, and ends in the left foramen lacerum medium. The left mastoid process has been broken off. The left zygomatic arch has been broken. The upper jaw is edentulous, and the walls of the antrum are as thin as paper, and in some places wanting.

It should be noted that the roof of the naso-pharynx has been involved in this and the last two specimens. G. C. 3312.

3. 10. Longitudinal Fissure of the Right Parietal and Frontal Bones.—Calvarium of an old man—in which the sutures on the outer side are for the most part obliterated—showing the above fissure.

The patient, having fallen about ten feet, had landed on his head on the stone causeway at Granton Breakwater. He lived in a comatose

condition for about twelve hours after his admission into the Royal Infirmary.

At the post-mortem examination, the fissure was found to have extended through the anterior fossa of the skull into the hard palate.

The fissure begins about two inches from the lambdoidal suture near the middle on the right side, and runs forward, keeping nearly parallel to the middle line. G. C. 3113.

Presented by P. H. MACLAREN, F.R.C.S.E.

3. 11. Fracture of the Base of the Skull.—Portion of the left half of the base of a skull—macerated—showing a fissure running from the vault into the base.

The patient had fallen down a stair, and struck the right occiput as well as the left parietal bone. A slight scalp wound, not down to the bone, was all that was seen at the occiput. He was treated as an out-patient at first, but upon his becoming dull, sluggish, and comatose, and showing some blood in his left ear, he was taken into the wards, where he died four days afterwards.

The fissure began on the parietal bone, and is seen extending downwards into the squamous portion of the temporal bone. One part passes forwards and another continues into the foramen spinosum. This latter is more visible on the inner than on the outer aspect. There was also some injury to the roof of the tympanum, and the membrana tympani was ruptured, but there is no part of the fissure traceable into the petrous part of the temporal bone.

It is of great interest to note that the membrana tympani was ruptured, and that there was bleeding from the ear, although there is no fissure to be detected in the petrous portion of the temporal bone, even after maceration. G. C. 2845.

Presented by P. H. MACLAREN, F.R.C.S.E.

3. 12. Dura Mater injured by Fracture of the Skull.—Dura mater from the foregoing case—dried—showing the laceration of this membrane, which was found below the simple

fracture of the left parietal bone. The specimen has become contracted in drying.

The ruptured part of the dura mater corresponds only with the portion of the fissure within the vault, a part not shown in the previous specimen. G. C. 2848.

Presented by P. H. MACLAREN, F.R.C.S.E.

3. 13. Brain injured by Fracture of the Skull.—Brain from the patient from whom the two previous specimens were taken.

There has been injury of the parietal lobe under the rupture in the dura mater, but there is still more extensive laceration at the base. The under surfaces of the left temporo-sphenoidal and of both frontal lobes have been severely lacerated. Possibly the injury to the frontal lobes may have been associated with injury of the right occipital region, but the injury to the left temporo-sphenoidal lobe is not what would have been expected from an injury to the parietal bone on the same side. See No. 3.5. G. C. 2846.

Presented by P. H. MACLAREN, F.R.C.S.E.

3. 14. Fracture of the Base of the Skull.—Posterior part of the base of a skull—macerated—showing a longitudinal fracture at the base.

The left petrous portion of the temporal bone has been broken off, and there are extensive fissures in the posterior fossa, especially on the left side. On the right side a fissure running along the upper surface of the petrous portion of the temporal bone has entered the roof of the tympanum.

F. P. C. 29.

3. 15. Fracture of the Base of the Skull.—Posterior part of the base of a skull—macerated.

In the right cerebellar fossa, close to the foramen magnum, there are three short fissures parallel to one another. The

temporal bone on both sides, but especially on the right, has been somewhat loosened from its articulations. F. P. C. 30.

For other fractures, involving the base of the skull, see Nos. 3.35 to 3.38.

COMMINUTED FRACTURES—CHIEFLY LOCALISED.

3. 16. Post-mortem punctured Fractures of the Skull.—Macerated calvarium, which has been struck from the outside with the small end of a hammer after death.

On the outer aspect of the left parietal bone there are two small apertures with indented edges. On the inner aspect the edges of these apertures are splintered off all round, and from the posterior one fissures radiate in various directions.

B. C. 1. 2. M. 8.

3. 17. Depressed Fracture of the Frontal Bone.—Frontal bone—macerated—showing a depression above the right frontal eminence.

Where the bone has been struck, it has been comminuted and driven in, and there is extensive splintering of the inner table. A fissure passes backwards from the injured spot to the coronal suture.

The more extensive involvment of the inner table, in such cases, is due to the direction of the injury, *i.e.* from without inwards, as illustrated in the previous specimen. F. P. C. 28.

Presented by Professor JOHN THOMSON.

3. 18. Depressed Fracture of the Left Parietal Bone.—Triangular portion of the left parietal bone of a soldier, showing an oval depression on the outside with extensive splintering of the inner table.

"Lance-Corporal P—— was admitted to Hospital on 31st July 1892, suffering from a wound of the scalp, three inches long, exposing the bone,

with a distinct depression in the centre of the wound. The injury was caused by a quoit, thrown from a distance of about 20 yards before it struck the skull. There was a rise of temperature and threatening of erysipelas on the fourth day after admission, but absolutely no other symptoms. On August 15th the wound had healed, except for about an eighth of an inch. On the evening of the 16th he made up his own bed and said good-night to the men in the ward. At about 8 A.M. the next morning he was found to be insensible, with stertorous breathing, and died in about an hour. At the post-mortem examination, recent lymph was found all over the surface of the left hemisphere, and about two drachms of pus below the fracture of the inner table. The dura mater was intact, and the brain substance beneath the fracture was not affected. The fissure from the depression to the edge of the bone was caused when removing the skull-cap. The curious part of the case is the absence of all symptoms. There were no eye or pulse symptoms and no pain. The treatment was local, with rest in bed and low diet."

This resembles what has been called "pond" fracture, with, in addition, the dint produced by the quoit. The more extensive splintering of the inner table is characteristic.

G. C. 3435.

Presented by B. LANGLEY MILLS, F.R.C.S.E., The Cake, Chakrata, **1892.**

3. 19. Depressed Fracture of Parietal Bone.—Portion of a left parietal bone—macerated—showing a depressed fracture and trephine opening.

A circle of bone has been removed with the trephine, but the depressed bone has not been raised. Had the depressed part been sawn through, elevation would have been possible from the trephine opening (Sir Charles Bell).

B. C. 1. 2. M. 10.

3. 20. Comminuted Fracture of Parietal Bone.—Calvarium —macerated—to show a fracture of the right parietal bone and a trephine opening beside it.

The fracture had apparently been produced by a blow, and some of the pieces had probably been depressed. The trephine opening evidently was to permit the elevation of some of the

fragments, while the Hey saw has also been used for a similar purpose. A limited fissure below and in front of the seat of fracture indicates that the bone had been forced in by the injury. The calvarium is interesting anatomically in its having a permanent frontal suture and in its presenting several wormian bones at the lambdoidal suture. B. C. 1. 2. M. 7.

3. 21. Compound depressed Fracture of Skull—Intercranial Suppuration—Death.—Skull-cap of a boy, showing a localised fracture at the junction of the sagittal and coronal sutures.

"The boy from whom this skull-cap was taken received a kick from a horse. Four fissures radiated from the point where the sagittal suture joins the coronal, and there was slight depression in one part. In eight days he had no bad symptoms. The wound was dressed with a dossil of oiled lint. After that time he began to have sickness, and vomiting, and severe headache. For four more days his breathing was stertorous, the left side of his body was paralysed, and he had convulsive twitchings of the right side. Pus oozed through the fissures in the skull; the operation of trepanning was performed. The external layer of bone separated before the internal layer was sawed through; a quantity of pus was washed away from the dura mater. The symptoms were not improved, and the boy died next day.

"*Dissection.*—There was extensive ulceration of the dura mater over the longitudinal sinus, and on each side of it; around the ulcer there were blotches of red inflamed parts. The dura mater was greatly thickened, and the ulcer had a shreddy surface, which was covered with pus of a bright yellow colour. The veins which entered into the longitudinal sinus were filled with dark coagulated blood, which could not be drawn out from the vessels. Anterior to the ulcer the longitudinal sinus was choked with a firm and light-coloured coagulum; posteriorly a quantity of pus was squeezed out from the sinus. Under the ulcer of the dura mater, there was also ulceration of the surface of the brain in both the hemispheres. The pia mater was turgid with blood. There was inflammation of the substance of the brain in the neighbourhood of the ulcer, but the rest of the brain appeared healthy. There was no fluid in the ventricles."

The fissures on the surface indicate that the bone was driven in at the moment of impact. The case has been one of compound depressed fracture, followed by death from sepsis.

B. C. 1. 2. M. 14A.

3. 22. Comminuted Fracture of the Skull.—Fractured portions of a cranium, removed at St George's Hospital.

The patient died. B. C. 1. 2. M. 11.

3. 23. Trephining for Fracture and Meningeal Hæmorrhage.—Portions cut out by the trephine from the skull of a boy 14 years old, by Mr Wilson.

"He had been thrown from a horse about two hours before I saw him. He was taken home insensible, and remained so until the operation. Finding the bone fractured, and a very copious hæmorrhage flowing from the fractured part, I immediately applied the trephine, and having thus made an opening and scooped out the coagulated blood, I found that the bleeding came from the principal artery of the dura mater, nearer the basis of the skull than could be got at without destroying life. I was obliged to apply the crown of the trephine seven times before I could remove all that pressed upon the brain. An hour after the operation the boy rallied and recovered without experiencing a single bad symptom in the cure. The operation was performed in 1792. In 1807 I saw him quite well, but the whole of the bone had not regenerated."

The under surface of the pieces removed by the trephine show impressions of the middle meningeal artery. As several of the circles are broken, the fracture must have traversed this region.

B. C. 1. 2. M. 13.

3. 24. Hairs driven into Fracture of the Skull.—Portion of bone removed by a trephine in a case of compound depressed fracture of the skull.

In the fissure on the outer surface of the fragment hairs are embedded, and it should be noted that this fissure is on the outer side only. From the case of Jane Porter, Ward 18, Royal Infirmary, Edinburgh. G. C. 3303.

Presented by A. G. Miller, **1891.**

3. 25. Compound depressed Fracture of the Skull.—Portions of the frontal bone removed in a case of fracture.

"On the evening of the 17th inst. (February 1828) William Murray was admitted with a compound fracture of the skull, attended with very considerable depression of the bone. The patient was quite irrational, and very violent when any attempt was made to examine the wound in the forehead. This was enlarged in the course of the fracture, and a small portion of the bone which was completely detached from the contiguous parts was then removed. This gave room for the introduction of the levator, by which the remainder of the depressed portions lying transversely across the forehead were first elevated, and subsequently removed with a pair of tooth forceps, leaving an oblong aperture of about two inches in length by three-fourths of an inch in its greatest breadth. A small portion of the brain also made its escape through the wound, although the breach in the dura mater was not perceived at the time of the operation.

"This patient instantly recovered his senses, and answered questions rationally; he soon, however, lapsed into a state bordering on coma, was extremely averse to being disturbed, his pulse 126 and thready, his extremities cold, and his respiration tranquil until the morning of the 18th, when it suddenly became stertorous. You saw him at the usual hour of visit evidently moribund, and he sank immediately afterwards, having survived the receipt of the injury not quite forty-eight hours.

"On the same evening you saw the head opened in the theatre. The fracture was found extending backwards from the two extreme points of the opening through both orbitar plates of the frontal bone, and passing transversely across the ethmoid behind the crista galli. Opposite to the fissures in the roof of either orbit the dura mater was found lacerated to a considerable extent, and portions of the brain protruding; its anterior lobes were found completely disorganised and broken down, and, what was remarkable, a distinct appearance of purulent matter was seen upon the tunica arachnoides covering each hemisphere of the brain, although the patient had survived the accident for so short a time, had lost a very considerable quantity of blood from the wound, and had manifested no inflammatory symptoms." (Sir G. Ballingall's Clinical Lectures, No. 3, p. 5.)

G. C. 1102.

Presented by Sir GEORGE BALLINGALL.

3. 26. **Fracture of the Skull.**—Two portions of a parietal bone —macerated—from a case of fracture.

One portion came away immediately after the accident, the other a "very considerable time" (some weeks?) after.

The edges of the larger portion show indications of having been separated by a process of granulation. G. C. 1166.

Presented by Professor JAMES RUSSELL.

3. 27. Fracture of the Skull.—Fragments of bone removed in a recent case of fracture of the cranium—macerated.

Presented by Professor JOHN THOMSON.

3. 28. Irregularity in the Thickness of the Skull.—"Portion cut out by the trephine"—macerated—"showing the necessity of inclining the instrument during the operation, owing to the variable thickness of the bones." B. C. 1. 2. M. 14.

3. 29. Irregularities in the Thickness of the Skull.—Skull-cap, —macerated—showing fracture in the left temporal region, for which trephining had been performed.

The irregularities in the thickness of the skull at the seat of operation and elsewhere are especially noteworthy. The saw, in removing the calvarium, has taken away more of the left than of the right side. B. C. 1. 2. M. 4.

COMMINUTED FRACTURES OF THE SKULL, WITH FISSURES LEADING FROM THEM.

3. 30. Depressed Fracture, with Fissures and Separation of Sutures.—Skull-cap, apparently of a young subject—macerated—showing the above.

There has been a depressed fracture at the lower and anterior part of the left parietal bone, and the trephine has been applied, evidently to permit elevation of the fragments. Longitudinal fissures more extensive on the inside pass backwards and forwards from the seat of injury. The coronal suture has been forced apart for about two inches on either side of the middle line, and beyond that point on the right side, the line of separation has been continued as a fracture passing through the right parietal bone. F. P. C. 23.

Presented by Professor JAMES RUSSELL.

3. 31. Depressed Fracture of the Vault of the Skull, with a Fissure passing into the Base.—Calvarium of a boy—macerated—showing a fracture of the frontal and right parietal bones.

"This boy was brought into the hospital in a state of death-like insensibility, and his head misshapen. An effusion upon the temple tempted me to make an incision through the scalp, and there I found the bone shattered. I applied a small trephine, and afterwards the cranium saw, and took away the pieces of broken bone, and washed out the coagulum from under, but there followed no amelioration of symptoms. The boy died, and now it is seen that a fracture extended round the forehead to the base of the skull, and that the injury was too great to allow of the expectation that the patient could live."

From the depression behind the seat of fracture, and from the horizontal fissure in the frontal bone, the injury must have been very severe. B. C. 1. 2. M. 2.

3. 32. Compound depressed Fracture of the Skull, with Fissure.—Calvarium of a boy—macerated—showing comminuted fracture of the right parietal bone, with a fissure running backwards into the occipital bone.

"The boy was kicked by a horse. The fragments were depressed, and so tightly wedged down that the trephine had to be twice applied before they could be elevated. The dura mater was torn, and the brain lacerated by the injury. Some brain matter escaped. The patient remained insensible, had convulsions, and died in five days after the accident."

B. C. 1. 2. M. 14 B.

3. 33. Laceration of Dura Mater from Fracture of the Skull.—Portion of dura mater—in spirit—from the previous case, showing a tear which lay below the seat of fracture.

B. C. 1. 2. M. 16.

3. 34. Comminuted Fracture of the Vault of the Skull, with extensive Fissures leading from it.—Skull—

macerated—showing the above injury, with a trephine opening and the mark of a Hey's saw.

The seat of injury has evidently been at the right parietal eminence, where comminution exists, and whence some comminuted fragments have apparently been removed by trephining. From the seat of injury at the right parietal bone one large fissure extends to the left beyond the middle of the left parietal bone. Another fissure passes forward into the coronal suture, and another descends through the back of the squamous portion of the temporal bone to end in the glenoid fossa. Another irregular fissure unites this with the coronal suture, and a small vertical split is seen in the mastoid process. The injury is one which might have been produced by a heavy blow upon the right parietal bone.

G. C. 1009.

3. 35. Severe Comminution and Fissuring of the Skull.—Right half of a skull—macerated—showing an extensive fracture.

From a patient in Middlesex Hospital. The scalp was wounded over the right temple and the skull fissures radiate from this region.

One fissure runs upwards from the temple along the coronal suture, and from the lower end of the split coronal suture an irregular fissure runs forward across the frontal bone to the orbit, and joins other fissures there. From the same starting-point a second fissure runs forwards and downwards to the roof of the orbit. A third, passing downwards, gives off a branch into the orbit, and then, continuing backwards, splits into two in front of the ear. One of these two runs in front of the meatus to reach the base, and the other, extending through the petrous and mastoid parts of the temporal bone, crosses the occipital bone and ends in the foramen magnum. The bones have been so much loosened that it has been necessary to keep them together with wire.

"Where the blow was received the fissure is very narrow, but on tracing it towards the base of the skull it is a gaping

rent. This is to be accounted for on the principle of counter fissure" (Sir Charles Bell). B. C. 1. 2. M. 6.

3. 36. Comminution of the Skull resulting from a Fall. —Calvarium of a man—macerated—showing a very great comminution of the right side and fissures on the left.

The patient was leaning out of a window in a court in the High Street. He lost his balance, and, after falling about thirty feet, landed on his head on the stone pavement below. He was brought at once to the Infirmary, but when admitted seemed to be dying. His head was flattened on the right side, and his right eye protruded from the orbit. There was no bleeding from ears, nose, or pharynx. A prominence in the back of the pharynx was taken to be a dislocation of the cervical vertebræ, and an unsuccessful attempt was made to reduce it. His pulse was slow and weak, and his breathing shallow and irregular. He died in about half an hour after the accident.

The amount of comminution is indicated by the number of wires necessary to hold the fragments together, after the soft parts were removed. The following specimen is the other part of this skull. G. C. 3094.

Presented by Macdonald Brown, F.R.C.S.E.

3. 37. Extensive Comminution of the Skull.—Base of the skull, with the three upper cervical vertebræ from the same patient as the previous specimen was taken from. The soft parts have been removed, except the dura mater and some ligaments.

The anterior fissure seen passing forwards on the right side in the previous specimen can now be traced into the frontal bone, and thence downwards in the roof of the right orbit, to end in the mesial line near the foramen magnum. The roof of the right orbit and the outer wall of the right middle fossa are greatly comminuted.

The right malar bone was broken, and a fissure (enlarged accidentally in cleaning the bone) involved the right half of the palate. On the left side there is a fissure beginning just above the external auditory meatus, and running irregularly

upwards into the vault, while there is also a horizontal fissure in the frontal bone, starting from the fissure already noted there, and extending nearly to the fissure in the left temporal fossa. This specimen is important as showing that extensive comminution of the vault and of the base, extending also into the bones of the face, may result from a fall upon the head.

No dislocation of the cervical vertebræ existed. A large hæmatoma had produced the swelling in the pharynx.

G. C. 3095.

Presented by MACDONALD BROWN, F.R.C.S.E.

3. 38. Compound Fracture of the Vault of the Skull extending into the Base—Pyæmia—Death.—Calvarium —macerated—from a man aged 20, with separation of the left half of the coronal suture, and a small localised fracture just above the temporal ridge on the left side.

On 27th July 1815 the patient was admitted to the Royal Infirmary, Edinburgh, with the history of having fallen a height of 30 feet on to his head. He had a scalp wound over the seat of fracture, and another above the left eye-brow. There was no bleeding from the nose or ears, and the patient was quite sensible. Pulse 66. He had slight vomiting at times, and his face had an anxious look. In the evening, as his pulse was 74, and as he complained of headache and restlessness, he was bled to 16 ounces, with little benefit.

Next day four leeches were applied to each temple. On the third day the patient seemed wonderfully well, but some inflammation had begun round the temple wound.

On the seventh day this wound was suppurating, and the bone below was bare. Five leeches were applied to each temple. The wound was poulticed, and antimony and saline mixture were given internally. From this time, in spite of repeated leeching and bleeding, he grew gradually worse, with headache, rapid pulse, and at first restlessness. Afterwards he became drowsy, and before death comatose. Rigors and vomiting occurred on the seventeenth and eighteenth days. On the nineteenth day he was trepanned, and the diploe was found to be purulent. On the twentieth day after the accident he died. And on August 16th, at the post-mortem examination, about four ounces of blood was found lying over the left orbit. The dura mater below the seat of operation was sloughy externally, and internally was covered by purulent matter for some distance round. The fracture on the frontal bone was traced down to the base of the skull.

Evidently this was a case of pyæmia and septicæmia following a compound fracture of the skull.

On the outside the bone is slightly roughened by inflammation below and behind the trephine opening, and internally new bone has been thrown out in the main groove for the middle meningeal artery. G. C. 1010.

3. 39. Compound Fracture of the Skull—Consecutive Abscess—Death.—Calvarium of a boy—macerated— showing a hole in the right half of the frontal bone. Two portions of the bone which were removed from the hole immediately after the accident are wired in position near it.

"The boy was kicked by a horse, and for four weeks was treated in the Royal Infirmary, Edinburgh. At the end of that time he left, apparently quite well, and with the wound healed. About five weeks after his dismissal he was twice seized with fits, and was re-admitted into the Hospital. The wound was now tumid and painful. A small speck of bone was removed from it. He lay in bed, listless and without complaining until he became suddenly blind; he remained sensible, and could recognise his dresser's voice; by his mother's account, his appetite was good. He died in strong convulsions.

"*Dissection.*—The scalp and dura mater adhered firmly together at the place of the cicatrix; the edges of the bone and dura mater were separate. A very extensive abscess was found to occupy almost the whole of the right hemisphere of the brain. The thinnest parts of the walls of this abscess were opposite to the wound and at the base of the brain near the optic nerves. It was calculated that about eight ounces of pus were evacuated from the abscess. There was no dead bone found on dissection."

The margins of the hole in the bone are rounded by the vital processes following the injury, whereas the margins of the loose fragments, removed at the time of the accident, are sharp. There are marks of increased vascularity all over the calvarium, especially on the inner side. B. C. 1. 2. M. 14 c.

3. 40. Septic Osteo-myelitis of the Skull, following Injury.—Calvarium—macerated—with a portion of dead bone in process of separation on the right side of the frontal bone.

"This man lay with the surface of the cranium exposed, and

the process of exfoliation going on. He was attacked with symptoms which were attributed for a time to the formation of matter under the skull, but which might be more correctly attributed to typhus fever, since after death no signs of affection of the brain could be discovered" (Sir Charles Bell).

The surface of the greater part of the frontal bone is roughened by the opening out of vascular pores, and the smooth dead portion of bone is surrounded by a groove formed by granulation tissue. There are two slight fissures in the frontal bone, one near the necrosed piece, and another at a corresponding place on the other side, but these may have been made in removing the calvarium. B. C. 1. 2. M. 14. D.

3. 41. Compound Fracture of the Skull—Septic Osteomyelitis—Death.—Portion of a cranium three weeks after fracture—macerated—with a dead piece in process of separation.

The dead piece is smooth and polished. The granulations have begun to cut a groove round it, and the adjacent bone is roughened by inflammation. The trephine has been applied.

G. C. 1165.

Presented by Professor JAMES RUSSELL.

3. 42. Compound Fracture of the Skull—Septic Osteomyelitis—Death.—Portion of a cranium after fracture, dura mater *in situ*—dried.

Part of the bone is in process of separation. The trephine has been twice applied. The cause of death has probably been septicæmia or pyæmia. G. C. 1155.

Presented by Professor JAMES RUSSELL.

3. 43. Compound Fracture of the Skull—Septic Osteomyelitis—Death.—Portion of the right frontal and parietal bones—macerated—from a case of compound fracture.

There has been extensive ulceration and necrosis, and

some bone is still in process of separation. The trephine has been thrice applied. G. C. 1156.

Presented by Professor JAMES RUSSELL.

3. 44. Septic Osteo-myelitis of the Skull, following Injury. —Part of the frontal bone of a "scrofulous boy"—macerated —showing a trephine opening and an irregular aperture from disease:

In consequence of a blow the bone became inflamed and carious, and the trephine was applied "to evacuate the matter."

On the outside the irregular, worm-eaten appearance resembles the effect of tuberculosis, but the new bone thrown out on the inside round the apertures more resembles the effect of septic irritation. G. C. 990.

3. 45. Septic Osteo-myelitis of the Skull, following Injury. —Portion of a right parietal bone, with the adjacent part of the occipital bone—macerated—showing the effect which followed an injury to the head.

There has evidently been septic osteo-myelitis, followed by necrosis. Most of the dead bone has been separated, but a small piece in process of separation still remains. The results of inflammation are much more numerous on the outer than on the inner aspect of the bone. The patient has been trephined as in the cases from which several of the previous specimens were taken. G. C. 595.

3. 46. Healed Fracture of the Skull.—Vault and part of the base of a skull, with an extensive old-standing fracture which had healed.

The marks of a fissure healed by bone are seen in the left half of the frontal bone and in the right parietal bone. In the line of the fissure, at the right side of the coronal suture, there

is a longitudinal gap in the bone measuring $2\frac{1}{2}$ by $1\frac{1}{2}$ inches. Its edges are smoothed and bevelled down to the level of the dura mater. On the inner aspect there are irregular markings, from chronic inflammation.

Probably there has been a compound comminuted fracture at the coronal suture, with a fissure extending obliquely forwards and backwards from this, and followed by necrosis of the comminuted fragments.

The specimen was found in Bamburgh Churchyard, Northumberland, in 1832. G. C. 1437.

Presented by JOHN EMBLETON, Esq.

3. 47. Old-standing Fracture of the Skull, with loss of Substance.—Part of a skull, with considerable loss of substance, said to be the result of fracture—in spirit.

The gap is filled by the dura mater. The bevelled and smoothed edges of the bony margin show that healing had taken place, but the sloughy look at one spot and the appearance of lymph on the inside indicate that inflammation had broken out afresh. G. C. 1058.

Presented by Professor JAMES RUSSELL.

GUNSHOT FRACTURES OF THE SKULL.

3. 48. Bullet Wound of the Skull, from the Battlefield of Culloden.—Calvarium of an adult — macerated — which has been perforated by a musket ball from front to back.

"The skull was found on that part of the field of Culloden where the Highlanders, wrapping their plaids about their left arms, and stooping low, made their attack on the King's troops."

In the upper part of the frontal bone, to the left of the middle line, there is an oval aperture measuring $1\frac{1}{4}$ inch by 1 inch. Its margin is regular on the outer surface, but on the

cranial surface the bone is chipped off irregularly round. At the back, in the right side of the occipital bone, between the superior curved line and the lambdoidal suture, there is a larger and more irregular aperture measuring $1\frac{1}{2}$ by $1\frac{1}{4}$ inch. In this case the greater irregularity and chipping off is seen on the outer surface, while the cranial margin is smooth, a condition the reverse of what is present at the anterior aperture.

As it is known that with the musket ball, at least, the entrance wound in the skull was smaller than the exit wound, and that the bevelling is with any bullet always on the margins of the apertures towards which the bullet is travelling, the condition of the apertures in this skull entirely corroborate the historical account of the action on that part of the battle-field on which it was found. B. C. XVII. 3.

3. 49. **Bullet Wound of the Skull.**—Portion of the right parietal bone behind and above the ear—macerated—to show aperture produced by a bullet wound.

The man, who was a servant, had shot himself. He lived for forty-eight hours afterwards. The bullet split in two. One part was found beneath the scalp, three inches from the wound, and the other part passed inwards, and was found beside the falciform process of the dura mater.

The hole is larger in its vertical than in its transverse measurement, probably from the upward direction of the shot, and the chipping is greater upon the cranial than upon the outer margin of the aperture. It may be noted that the bevelling is greater on the inner and upper surfaces, than upon the posterior and lower surfaces, probably indicating the direction of the bullet. At the upper part of the outer margin some lead has been impacted. This probably points to where the ball was split. B. C. XVII. 2.

3. 50. **Gunshot Wound of the Skull, from a Pistol held close to the Temple.**—Front half of the vault of

the skull of a man who lived for six days after having shot himself with a pistol in the right temple.

Sir Charles Bell saw the patient the day after the injury, and found him "more rational than he had been for some weeks." His face was enormously swollen and distorted. An incision was made over the left temple. After raising the bone, the ball was found flattened and was extracted. The patient survived for four days after this.

There is an aperture, $3\frac{1}{4}$ inches by $\frac{1}{2}$ inch, at the anterior inferior angle of the right parietal bone. The chipping off within shows that the ball had entered there. On the left side, above the outer end of the left supraciliary ridge, the bone is extensively broken and splintered, and more so externally than internally, indicating that the shot had struck that part from within. B. C. 1. 2. M. 12.

3. 51. Bullet Wound of the Skull.—Four pieces of a soldier's skull and a round bullet—Waterloo case.

"Here the ball entered the brain, and, making its exit, drove up portions of the skull, which were driven up by the ball which lay within the brain (*sic*). In extracting the ball a portion of the brain came out. The patient did well, complaining from the first only of headache." B. C. XVII. 4.

3. 51a. Bullet Wound of the Skull.—Oil painting by Sir Charles Bell, showing the above.

"The ball entered in the forehead, penetrated the skull and drove up the bone, elevating two portions at an angle. The scalp was cut upon at this part, the bone raised and the ball extracted. . . . I . . . do not know his fate." B. C. XVII. 10.

3. 52. Bullet Wound of the Skull.—Portions of a soldier's skull, fractured by a bullet wound.

The patient was struck with a musket ball, which caused a circular depression formed by these fragments, and they were removed without the aid of a trephine. "The man had no bad symptoms, and did well." (Probably a spent shot.) B. C. XVII. 7A.

3. 53. Bullet Wound of the Skull.—Oil painting by Sir Charles Bell, showing the wound from which the specimens forming the previous preparation were taken.

The aperture is circular, but it is expressly stated that the trephine was not used. B. C. XVII. 9.

3. 53a. Gunshot Injury of the Scalp.—Oil painting by Sir Charles Bell, showing the above.

"Sketch of a soldier who received a musket ball in the forehead which had run under the scalp, and was cut out and found to be flattened. B. C. XVII. 8.

3. 54. Cannon-ball Wound of the Skull.—Portion of the occipital bone, with the soft parts cleaned off, except at the aperture in the bone—in spirit.

The injury is said to have been produced by a cannon-ball.

The patient had evidently survived for months at least. The gap has been filled by fibrous tissue, one fissure has healed by bone, and marks of chronic inflammation remain on the interior of the bone surrounding the deficiency. G. C. 1072.

Presented by Professor JAMES RUSSELL.

3. 55. Cannon-ball Wound of the Skull.—Portion of a skull—macerated—showing a small aperture, with new bone formation in the neighbourhood.

The patient was injured by a cannon-ball. He did well for a time, but afterwards died.

The specimen shows a small aperture with rounded margins (more like a bullet wound). The surrounding bone shows signs of considerable inflammation, and much new bone is thrown out especially on the cranial aspect. G. C. 1151.

Presented by Professor JAMES RUSSELL.

3. 56. Fracture of the Cranium by a Musket Shot.—

Skull of a young adult—macerated—to show a bullet wound and trephine opening in the left frontal region.

"The ball struck this soldier on the sphenoidal angle of the frontal bone. It fractured the bone into small pieces. These were picked away, and a question arose whether or not the ball had entered. The dura mater was entire. It had not, then, entered the cavity, and an examination being made with the probe under the skull, the ball was discovered lodged above the left eye. Calculation being made of its exact distance from the place of the fracture, the trephine was applied there, and the ball extracted. The portion of the bone cut out by the trephine is attached to the skull, and the ball is replaced. The ball is flattened in that manner to give the idea of its only being half a ball. The man died of suppuration in the brain."

The piece of bone and the ball alluded to in Sir Charles Bell's account of the case have been mislaid or lost.

The upper left canine tooth is retained within the alveolus in this skull. B. C. XVII. 1.

3. 57. Old-standing Pistol Shot Fracture of the Skull.—Skull of an aboriginal Australian from Upper Brisbane, Queensland, Moreton district—macerated—showing an old-standing injury in the right frontal region.

"While uncivilised, this man was shot in the head by a squatter at 60 yards distance (size of bullet, No. 12). The ball penetrated just above the right supraciliary ridge, and destroyed part of the roof of the orbit, where it seems to have been lodged. For two weeks the man suffered from paroxysms of intense pain. The bullet was then spontaneously discharged, along with much pus, and he soon recovered. For the next seven years until his death he acted as a shepherd, and was very intelligent for a native. During three years he suffered from a dull headache more or less constant. He was killed in a quarrel with another native."

The skull is very heavy and thick, and the bony ridges are strongly marked. G. C. 2531.

Presented by —— FORBES, Esq.

3. 58. Sabre Wounds of the Skull.—Skull of a young adult, showing sabre cuts behind the vertex.

It was picked up on the field of the battle of the Pyramids.

There are three parallel cuts in the back of the skull, and

a large piece of bone has been taken out between two of them. B. C. XVII. 6.

3. 59. Sabre Wounds of the Skull.—Skull cap of an adult—macerated—showing the above.

The soldier had been one of Napoleon Buonaparte's cuirassiers at the Battle of Waterloo.

There are eleven sabre cuts, all about the vertex of the skull.

Figured in Dr Hennen's "Principles of Military Surgery," 1st edition, p. 283, plate vi. fig. 5.

Presented by Professor JOHN THOMSON.

3. 60. Sabre Fracture of the Skull.—Portion of the skull of a French soldier—macerated.

It was detached by a sabre cut, and removed by Sir Charles Bell. The man had received numerous sabre wounds. Waterloo case.

B. C. XVII. 5.

FRACTURES OF THE LOWER JAW.

3. 61. Double fracture of the Lower Jaw.—Lower jaw of an adult—macerated—showing fracture in two places.

The patient, aged 67, fell from his cart. The second, third, and fourth ribs of his right side and the second rib of his left side were broken. The portion of the lower jaw between the fractures was stripped of its periosteum, and as it lay loose in the mouth it was removed.

A wound extended from the (left) angle of the mouth downwards. The nasal bones were fractured. The patient died in three days after the injury.

On the right side the fracture is vertical, and lies in front of the canine tooth. On the left side it is oblique, and, beginning behind the canine, runs downwards and backwards.

G. C. 1299.

Presented by Dr JOHN CAMPBELL.

3. 62. Fracture of the Lower Jaw.—Greater part of the lower jaw of a young man broken off during life—macerated.

He was ploughing in Australia, and fell before the plough, which dragged out this piece of bone. He recovered.

Presented to Dr Struthers by his pupil, Mr John Thomson, 1862-63. G. C. 3470.

Presented by Professor STRUTHERS, F.R.C.S.E., 1893.

3. 63. Ununited Fracture of the Lower Jaw.—Right and left portions of the lower jaw of an adult—macerated—showing the above.

The ends of both pieces are atrophied, especially, however, the right. This one is also smaller, and shows less prominent ridges for the attachment of the masseter, and has a smaller and relatively shorter condyle. B. C. 1. 1. M. 12.

FRACTURES OF THE SPINE.

3. 64. Fracture of the Atlas and Axis.—Atlas and axis—macerated—showing the above.

The man from whom this specimen was taken had fallen from a height of 50 feet, and, landing upon his shoulders, was instantly killed. The dorsal part of his spine was also extensively injured. (See 3. 77.)

The anterior arch of the atlas and the odontoid process of the axis at its junction with the body are broken through, and a portion of the former is broken off. B. C. 1. 4. M. 1.

3. 65. Fracture of the Posterior Arch of the Atlas and Odontoid Process of the Axis.—Wax cast of a fractured atlas and axis in which there had been great displacement without any pressure upon the spinal cord.

The patient from whom the specimen was taken was a powerful though scrofulous man aged 32. Nine months before his death he had fallen from a hay-rick, and landed on his occiput. He was stunned by the fall, but was soon able to walk half a mile to see his doctor. In two days he was attending to his ordinary work as an agricultural labourer, with only stiffness of his neck. Symptoms of inflammation set in at the seat of

fracture for which leeches and setons were applied, without much benefit. Afterwards he had a sharp attack of pleurisy, followed by severe hydrothorax and general œdema, from which he died. From first to last there was no evidence of affection of either motion or sensation. (See *Medico-Chirurgical Transactions*, London, vol. xx. p. 78.)

The remarkable escape of the spinal cord is explained by the fact that the posterior part of the arch of the atlas remained in position while the rest of the bone was dislocated forwards, carrying with it the odontoid process, which was at the same time snapped off. This accident seems to be unique.

G. C. 2782.

3. 66. Fracture of the Fourth Cervical Vertebra.—Axis and five succeeding cervical vertebræ, with the spinal canal laid open; muscles dissected off—in spirit.

The right vertebral artery was torn, and severe bleeding took place into the spinal canal and compressed the cord. The nerves and membranes were found perfectly natural and undisturbed.

There is an oblique fracture through the upper part of the body of the fourth cervical vertebra, which extends into the left transverse process.

The articular processes between the third and fourth vertebræ have been dislocated on the left side. G. C. 909.

Presented by William Newbigging, F.R.C.S.E., 1827.

3. 67. Dislocation between the fourth and fifth Cervical Vertebræ.—Cervical and first dorsal vertebræ, with the muscles dissected off—in spirit.

A fishwife, apparently in good health, was being pulled out of bed, in a frolic, by companions. It is uncertain whether the accident occurred when the head alone rested on the edge of the bed, or when it reached the floor. The limbs and trunk were paralysed. Breathing was carried on by the diaphragm for a day or two, until death took place.

There is no appearance of fracture, and the dura mater appears to be drawn out between the separated vertebræ. G. C. 3456.

Presented by Professor John Struthers, 1893.

3. 68. Dislocation and Fracture between the fourth and fifth Cervical Vertebræ—Upper five cervical vertebræ, spines and laminæ removed, the dura mater opened, and a longitudinal section made of the spinal cord. The muscles are partly cleaned away, and the preparation is in spirit.

The spinal cord has been crushed opposite the interval between the bodies of the fourth and fifth cervical vertebræ. The fifth vertebra is attached to the fourth only by the nerves of the spinal cord. G. C. 2056.

Presented by ALEXANDER WATSON, F.R.C.S.E.

3. 69. Complete Dislocation forwards of the Body of the fourth Cervical Vertebra, with partial Fracture of its Laminæ.—Section to the left of the middle line of the upper six cervical vertebræ, showing the above—in spirit.

The spinal cord has been crushed between the laminæ of the fourth and the body of the fifth vertebræ. Note the comparatively small irregularity of the spinous processes, which is compatible with such a serious pressure upon the cord by the dislocation of the bodies. G. C. 2095.

Presented by ALEXANDER WATSON, F.R.C.S.E., 1839.

3. 70. Fracture and Dislocation of the fifth and sixth Cervical Vertebræ, with Fracture of the fourth and fifth Spines.—Lower six cervical vertebræ, with the muscles cleaned off—in spirit, showing the above injury.

"J. S., æt. 45, fell backwards from a height of four feet, and landed on the back of his neck against an iron railing.

"The house surgeon reports of this man that when he was brought into the Hospital he was perfectly sensible; that his face indicated great alarm and anxiety. Every time he drew his breath it was attended with an effort to raise his shoulders, and a contraction of the muscles of the throat. Every time he breathed his head appeared to sink beneath his shoulders. On putting the hand on the pit of his

stomach no motion of the viscera of the abdomen could be perceived. He had no feeling even in the upper part of his chest; he had feeling on his face and neck, and indistinctly near the collar-bone. He had a motion of his hands, a sort of rolling motion, which may have proceeded from the shoulders. When he spoke it was in a tremulous voice, like a man frightened. His voice was weak, but he did not speak in a whisper; the sound of his voice was more like sighing than common breathing. Pulse was felt at his wrist. In ten minutes after he was brought in, half an hour from the time of the accident, he died."

The spinous processes of the fourth and fifth cervical vertebræ are broken off at their roots, the bodies of the fifth and sixth cervical vertebræ have been dislocated, and the upper part of the sixth vertebra has been fractured. The fifth transverse process has been broken on the right side, and the sixth and seventh on the left side.

"It is clearly proved both by the symptoms and the dissection of the bones, that the fracture must have affected the roots of the phrenic nerves; and we are at liberty to conclude that the difference of symptoms, in comparing it with the first case (3. 71) as well as the shorter period of his sufferings, was due to this cause." (Sir Charles Bell's "Exposition of Nervous System," p. 237.) B. C. 1. 4. M. 3.

3. 71. Fracture of the Bodies and Arches of the fifth and sixth Cervical Vertebræ.—Lower six cervical and first dorsal vertebræ, with the muscles cleaned off to show the above injury—in spirit.

"Charles O., æt. 36, fell through a window into an area thirteen feet below. He thought that he landed on his back, but was uncertain, as he lay for some time insensible. In Hospital he lay supine—legs powerless and insensible, abdominal muscles relaxed and powerless, and viscera flaccid. His water had to be drawn off with a catheter, and his fæces were passed involuntarily; priapism was present. Skin of abdomen and up to the nipples insensible. However, he had feeling in his stomach when it was pressed upon, and complained of the griping of some of his medicines.

"His breathing was frequent. At each inspiration the chest was heaved with a short, quick movement; at each expiration the belly was protruded by a sudden shock and undulation (*sic*). The belly during this

effort of breathing, was uniformly soft and full, drawn in by the elevation of the ribs, and protruded when they fell again.

"He could yawn, but could not cough nor otherwise strongly expire except by the weight of his thorax.

"During inspiration the serratus magnus and lower part of the trapezius could be felt in action.

"He could raise his shoulders, rotate his humerus, and flex his fore-arms, but had no power over his hands. The skin of his 'arms' was sensitive to the prick of a pin.

"He died on the night of the seventh day from the accident." (Case of Charles Osborne in Bell's "Exposition of the Nervous System," p. 225.)

The bodies of the fifth and sixth cervical vertebræ have been crushed. The lamina of the fourth vertebra has been broken, and those of the fifth and sixth have been comminuted on the left side.

The movements of the arms described indicate the escape of the fifth cervical nerves from injury. B. C. 1. 4. M. 4.

3. 72. Dislocation of the fifth and sixth Cervical Vertebræ.—Lower six cervical vertebræ, with the muscles cleaned off—in spirit, showing the above (without apparent fracture).

The ligaments are torn through between the laminæ and spinous processes, but at the body some have been left.

B. C. 1. 4. M. 5.

3. 73. Dislocation of the fifth and sixth Cervical Vertebræ, followed by Suppuration within the Canal.—Lower six cervical vertebræ, with the muscles cleaned off—in spirit—showing the above dislocation.

"Marshall, a coal waggoner, was riding on the shaft of his cart, when by a sudden jerk he was thrown off, and pitched on the back of his neck and shoulders. There was a swelling and discolouration between his shoulders. Although he could not stand, yet he could drag his legs after him, when he was supported to his bed. For nearly a week he lay complaining of nothing, and had no symptoms of paralysis. He could throw his arms and legs about, and retain his fæces and urine, and expel them naturally. On the eighth day, he was suddenly seized with convulsions over the whole body. After having been bled, he remained

sensible, though his jaw was locked. His convulsions returned, and he was relieved by bleeding. In a few hours his jaw began to move with great rapidity, and continued moving in an extraordinary manner for nearly five minutes, when all at once he exclaimed that he could speak. He was maniacal. He proved he was not at all paralytic, for it required two men to hold him, and he almost sprung out of bed to be revenged on the nurse. He passed a great deal of fæces and flatus with singular force. In twelve hours he became again rational. On the third day after the attack of convulsions he complained of difficulty in using his arm, and two days after he had total palsy of the lower extremities, which was more remarkable as at this time he regained the use of his arm. He lived for a week after this, but continued sinking, and still retained about him much of the character of typhus fever. The day before his death he was perfectly sensible, and had recovered sensation in his legs, for he could feel the rubbing of a finger upon them. At this time, although he appeared to pass his fæces involuntarily, still he passed them with great force, and he was able to eject an enema which was given contrary to his desire.

Dissection.—The brain was examined carefully, and nothing was remarked except a little effusion between the pia mater and tunica arachnoides. On cutting the muscles by the side of the last cervical vertebra, a little pus oozed out. It was found to come from between the vertebræ. On dissecting up the muscles, there was found to be an evident loosening of the last cervical from the first dorsal vertebræ. The interventral substance was completely destroyed, and an immense quantity of pus surrounded them. On the back part the pus had extended under the scapula, and on the fore part was bounded by the œsophagus. On examining the spinal canal, the pus was found to have dropped down the whole length of the sheath to the cauda-equina." (*See* Bell's "Surgical Observations," 1816, p. 145.)

There is a complete dislocation, without apparent fracture. The anterior ligament is stripped off the seventh cervical vertebra, but without being torn through; the other ligaments have been ruptured. B. C. 1. 4. M. 6.

3.74. Partial Dislocation forwards and Fracture of the sixth Cervical Vertebra.—Last three cervical and first dorsal vertebræ—partially macerated, dried and varnished, showing the above condition of the sixth vertebra.

Paralysis of the body below. He lived twenty hours. (Case of William Wood, Royal Infirmary, Edinburgh, 1804.)

On the left side the lower articular process of the sixth

cervical vertebra has been dislocated forwards ; on the right side the lower articular process with adjacent part of lamina has been broken from the rest of the bone.

There has been a slight fracture of the upper part of the body of the seventh cervical vertebra, especially towards the left side. G. C. 173A.

Presented by WILLIAM BROWN, F.R.C.S.E.

3. 75. Dislocation between the last Cervical and first Dorsal Vertebræ.—Last three cervical and upper three dorsal vertebræ, with the muscles cleaned off—in spirit—showing the above dislocation.

"The man fell headlong from a barge lying aground in the Thames. His head stuck in the mud, and the whole weight of his trunk and limbs was thrown on the neck, and an obliquity in the direction of the force probably twisted the vertebræ. He died instantly."

There seems to be no indication of fracture. The dura mater is seen between the separated vertebræ. B. C. 1. 4. M. 7.

3. 76. Severe Crushing Fracture of the third and fourth Dorsal Vertebræ.—First seven dorsal vertebræ, with the adjacent parts of the ribs—cleaned, dried, and varnished, and the canal exposed by the removal of the laminæ on the right side, showing the above condition.

The patient was a lad, aged seventeen. There was paralysis below the injury, with priapism. He lived twenty-five days.

The adjacent parts of the third and fourth bodies have been greatly crushed. The remainder of the body of the third, with those of the vertebræ above, have been displaced forwards. The heads of the fourth ribs on both sides, as well as those of the fifth, sixth, and seventh ribs on the right side have been broken. The spine of the first, and the spines and laminæ of the second and third vertebræ, have also been fractured. The cord must have been crushed. This has evidently been a case of fracture by forcing the spine forwards.

Presented by WM. BROWN, F.R.C.S.E., 1807.

3. 77. Crushing of the Body of the fifth Dorsal Vertebræ with Fracture of several Spines and Ribs.—Lower five cervical and upper seven dorsal vertebræ, with the adjacent portions of ribs—macerated and dried, showing the above injury.

The patient, a man, having fallen from a height of 50 feet, landed on his shoulders, and was instantly killed by compression of the cord just below the medulla oblongata (*see* 3. 64).

The whole of the body of the fifth and the upper part of that of the sixth dorsal vertebræ have been comminuted by crushing. There is also fracture of the seventh cervical and first four dorsal spines, and fracture of the first, second, third, fourth, and sixth right ribs, and of the fifth and sixth left ribs at their articulations with the bodies and the transverse processes of the vertebræ.

The crushing of the fifth body has probably been caused by the forcible forward bending of the spine, while the injury to the spinous processes and ribs may have been the result of direct violence. B. C. 1. 4. M. 15.

3. 78. Severe Crushing and Comminution of the Body of the sixth and Part of that of the seventh Dorsal Vertebræ.—Lower part of the third and following six dorsal vertebræ, with the adjacent parts of the ribs. The muscles and most of the ligaments are cleaned off—in spirit—showing the above injury.

"Thomas Wills, æt. 30, while trying to extinguish a fire, fell from the roof of a house for a distance of two stories, and landed with his back upon the pavement. (He seems to have been doubled forwards, and perhaps turned a somersault as he struck the ground.)

"No injury to the spine was to be felt, but he had lost sensation of and motion in all the lower part of his body and lower extremities. The bladder and intestines were insensible to their natural stimuli; he complained of a pain in his back, and referred it to the middle dorsal vertebræ.

"Respiration was performed by a heaving of his chest, the abdomen being full and flaccid. There was a catch in his breath from pain running round his ribs on a line with the injury of the spine.

"For six days he remained in this state, the catheter being used twice daily.

"At the end of this time his breathing became more affected. On the twelfth day after the injury his breathing became more rapid—60 per minute. It afterwards became slower, and he died. He was frequently bled and cupped, but without relief.

"At the post-mortem examination much coagulated blood lay over the sixth and seventh dorsal vertebræ, and the spinous processes of these vertebræ were broken. The tube of the spine was forced in upon the spinal marrow, and a sharp portion of bone belonging to the body of the vertebra had pierced and lay pressing on the spinal marrow. A rib was fractured on the left side, the broken extremity of which pressed against the pleura. This side of the chest showed marks of inflammation."

The body of the sixth dorsal vertebra is severely crushed and comminuted, as in the previous specimen, and the upper part of the seventh body has been broken off on the right side. The heads of the fifth and sixth ribs have been broken off on the left side. The laminæ and spine of the sixth vertebra has been fractured horizontally, and the left lamina of the seventh vertebra vertically. One of the pieces of the body of the sixth vertebra was driven back upon the spinal cord.

B. C. 1. 4. M. 8.

3. 79. Healed Fracture of the Dorsal Spine, after Severe Crushing.—Dorsal vertebræ, from the sixth to the eleventh inclusive, with the corresponding ribs—macerated and dried. The laminæ are removed to expose the spinal canal from the back.

The spinal cord was torn across, and the patient survived the injury nearly two months.

The condition seen is the result of extensive crushing and comminution of the bodies of the seventh, eighth, and ninth vertebræ, with subsequent healing.

The spinal canal is entirely obliterated by crushing back of the bodies upon it. The crushing has been so complete that, except for the presence of the ribs, it would have been almost impossible to have said how many vertebræ were involved. On the left side, the seventh, eighth, and ninth ribs are packed as closely as they will go. It may be noted that, as is com-

monly the case, the upper part of the spinal column is displaced in front of the lower. G. C. 1473.

Presented through Sir GEORGE BALLINGALL by Drs BRIGGS, MUDIE, and THOMSON of St Andrews, 1833.

3. 80. Fracture of the Spine in the Mid-Dorsal Region.—Fifth to ninth dorsal vertebræ—macerated and dried—showing the above injury.

The seventh vertebra has suffered most of all. Its body is comminuted, its transverse processes broken off, and its laminæ fractured near the pedicles. The front of the eighth body has been broken off; also the following transverse processes, the right of the fifth vertebra, both of the sixth, and the left of the eighth and ninth. The fracture has evidently been produced by bending forward the spine, with the usual tendency to forward displacement of the upper fractured portion of the column. G. C. 3309.

3. 81. Displacement forward of the ninth Dorsal Vertebra and partial Fracture of the tenth, with Crushing of the Cord.—Section of the lower half of the ninth and of the tenth, eleventh, and twelfth dorsal vertebræ. The muscles are dissected off, and the preparation is mounted in spirit, to show the above injury.

The patient, a miner, æt. 29, was doubled forwards by a mass of earth falling upon his shoulders. He had complete loss of motion and sensation in his lower limbs. He could not make water, but the bladder emptied itself after a catheter had been inserted. A plaster jacket was applied. On the third day he had septic cystitis, very fœtid urine, and considerable pain across the abdomen.

On the ninth day he died of collapse, with vomiting, belching, and abdominal symptoms.

At the post-mortem examination the bladder was found to have sloughed into the peritoneum, and his death had been due to septic peritonitis.

The body of the ninth dorsal vertebra has been crushed

downwards and forwards, and the spinal cord and accompanying nerves have been crushed between the body of the tenth and the lamina of the ninth vertebræ. G. C. 2903.

Presented by JOHN DUNCAN, F.R.C.S.E.

3. 82. Fracture through the tenth Dorsal Vertebra in an Old Man.—Portion of the ninth and the tenth, eleventh, and twelfth dorsal and first lumbar vertebræ—the muscles cleaned off, dried and partly varnished, to show the above condition.

The spine had previously been anchylosed, and therefore would not bend. The fracture has passed irregularly through the body, lamina, and spinous processes. The bony masses which had produced the previous anchylosis are seen on either side of the front of the bodies (*Arthritis deformans*).

See Bell's "Observ. on Injury of the Spine and Thigh Bone," plate ii. fig. 1.

B. C. 1. 4. M. 14.

3. 83. Dislocation forwards of the tenth, and Fracture of the Body of the eleventh Dorsal Vertebræ.—Section through the bodies and laminæ of the lower part of the sixth and of the seventh, eighth, ninth, and tenth, and part of the eleventh dorsal vertebræ, to show the canal from the front. The muscles are dissected off—in spirit.

The body of the tenth vertebra has been displaced forwards and downwards, and has crushed a fragment from the upper and back part of the eleventh vertebra back upon the spinal cord, so as to bruise and compress it. An irregular fracture is seen running through the body of the eleventh vertebra.

This specimen was used by Sir Charles Bell as an argument for the uselessness of trephining the spine after injury.

Figured in Bell's "Observ. on Injury of the Spine and Thigh Bone," plate i. fig. 1.

B. C. 1. 4. M. 11.

3. 84. Forward Dislocation and Fracture of the Body of the eleventh, and Fracture of that of the twelfth Dorsal Vertebræ.—Eleventh and twelfth dorsal and first lumbar vertebræ—cleaned, dried, and varnished, to show the above condition.

The patient, John Cameron, was admitted to the Royal Infirmary, Edinburgh, on 12th October 1807, with loss of motion and sensation below the thorax, as the result of an injury. About a week before death it was noted that his water continued to be mixed with purulent matter, and also that the catheter was introduced with difficulty, apparently from its point getting into a false passage. There was a very extensive slough over the os sacrum, as well as over the injured part of the spine, the latter being on the increase. At this time the patient was incoherent, and took little food. On the morning of 2nd November he was attacked with spontaneous vomiting of a greenish-coloured matter, and on the following day his pulse could hardly be felt at the wrist, while the vomiting had been continuous. On 4th November—*i.e.*, twenty-three days after the accident—he died.

The spinal canal must have been completely obliterated and the lower end of the cord crushed. G. C. 173 B.

Presented by Wm. Brown, F.R.C.S.E., 1807.

3. 85. Dislocation forwards of the eleventh, with Fracture of the Body of the twelfth Vertebra.—Sections of the last three dorsal and first lumbar vertebræ, with the muscles cleaned off, showing compression of the cord by displacement of the vertebræ—in spirit.

A. M., æt. 31, a fireman, on 26th February 1891 fell through a hatchway into the forepeak, a distance of ten feet, and must have landed across an iron wheel, but cannot say how he struck it, as he was rendered unconscious. He was pulled up by the sailors, by means of a rope under his arm-pits, carried to his berth, and next day taken to Hamburg Hospital. There he lay for two months till he was brought to Leith, and admitted to the Royal Infirmary, Edinburgh, on 29th April 1891. On admission he was very white, weak, and prostrate. He had no feeling below the iliac crests, and neither movement nor sensation in the lower limbs. There was tactile sensation in the lumbar region, but it was delayed. Some hyperæsthesia existed above the twelfth rib. There was a depression below the twelfth dorsal spine. There were bedsores on the sacrum, the calves, and at the malleoli of both legs. Sphincters were relaxed, and fæces and the urine came away involuntarily. The urine

was turbid and ammoniacal. The patient's bladder was washed out, and his bedsores attended to. In spite of all treatment, he got gradually weaker, and died, partly of exhaustion, and partly of septic absorption, about two months after his admission.

The portion suspended above shows well the compression and crushing of the anterior part of the body of the twelfth, with the forward displacement of the eleventh dorsal vertebra, so as to diminish the spinal canal by drawing the laminæ of the eleventh towards the upper part of the body of the twelfth. The portion of the specimen suspended below shows the effect of this displacement upon the lower end of the cord, and the nerves accompanying it. G. C. 3316.

Presented by A. G. Miller, F.R.C.S.E.

3. 86. Dislocation forwards of the eleventh, with Fracture and crushing backwards of the Body of the twelfth Dorsal Vertebra.—Last two dorsal and upper two lumbar vertebræ—cleaned and dried—showing the above injury. The right halves of the bodies have been removed, so as to display the canal from the front.

The patient lived for about six weeks after the accident.

The crushing backwards of the last dorsal body has been so great that at their anterior margins, the lower border of the eleventh dorsal and the upper border of the first lumbar vertebræ almost touch, and the body of the twelfth dorsal vertebra has been crushed back upon the canal, so as to completely obliterate it. F. P. C. 51.

3. 87. Dislocation forwards of the last Dorsal, with Fracture and Displacement of the first Lumbar Vertebræ.—Section of the bodies and laminæ of the last two dorsal and first four lumbar vertebræ—with the muscles cleaned off—in spirit, showing the above condition.

The patient was a coal miner, and while working in a pit was struck on the back by a mass of earth.

At first he was said to have had some movement in his legs, but by the time he reached the Royal Infirmary, Edinburgh, all motion and sensation in his lower extremities had disappeared.

His bladder was paralysed, and in two days hæmaturia began and continued. In spite of every care in cleansing the catheter used to draw off his water, septic cystitis appeared in a few days, and carried him off about a week after the accident.

At the post-mortem examination the mucous membrane of the bladder was found greatly congested, and at places sloughing. The congestion extended up both ureters. The left kidney was bruised.

The end of the spinal cord and beginning of the cauda equina have been crushed between the laminæ of the twelfth dorsal and the body of the first lumbar vertebræ.

The anterior part of the first lumbar vertebra has been so much crushed that the anterior margins of the last dorsal and second lumbar vertebræ nearly meet. G. C. 2799.

Presented by JOHN DUNCAN, F.R.C.S.E.

3. 88. Fracture of the Spinal Column at the Level of the second Lumbar Vertebra.—Lower part of the last dorsal and first three lumbar vertebræ—muscles cleaned off—in spirit, showing the above injury.

"A young man, named Auton, 25 years of age, a plasterer, fell from a height of 40 feet, and in his descent his back struck against the corner of a stone stair, about 18 feet from the ground. When brought to the Hospital, a swelling was to be felt over the lower dorsal vertebræ. On pressing the finger deep, a depression or interval betwixt the spinous processes could be distinguished. He complained of great pain in the part, and all over the abdomen. He breathed naturally, and was perfectly sensible; there was no defect of motion or of feeling in the lower extremities. He was bled to sixteen ounces, twelve leeches were applied to his back, and he had a dose of the house physic. He was admitted September 12th, 1816.

"13*th.*—He has passed a restless night. He is in great pain; he vomits everything he takes; the purgative mixture was rejected, and he had no relief in his bowels. An enema ordered.

"14*th.*—He is delirious. His pulse frequent, not full; his skin hot. He passes his fæces and urine involuntarily, but there is no flaccidity of the abdominal muscles, and he has the perfect use of his limbs.

"15*th.*—This young man's condition is very threatening; his pulse is 136. He was delirious during the night, and threw himself out of bed. He is now in a state of extraordinary excitement, and although he has

full motion of the limbs, yet the spine is undoubtedly broken or crushed, and he will, I fear, die with the symptoms of the last case, and from the same cause—suppuration within the tube of the spine.

"*Evening.*—He is delirious, and like a man who is good-tempered in his cups. His stools and urine still pass involuntarily. Pulse 130, weak.

"17*th.*—It has been necessary to tie him down in bed. He now appears dying. His breathing is very quick and laboured; his pulse hurried; his countenance is sunk, and his tongue is covered with a brown fur. About an hour before death a change took place from that happy delirium, and groaning as in much pain, he fell insensible and died. The eleventh dorsal vertebra (*sic*) was fractured in its body. The spinous process of the same vertebra was crushed. The spinal marrow did not appear to have suffered mechanically, or to have been crushed. Pus, thick in consistence and of a greenish colour, lay betwixt the sheath and the spinal marrow. There was an effusion of serum betwixt the membranes of the brain."

It is evident, on carefully examining the specimen, that the injury has been to the second lumbar, and not to the eleventh dorsal vertebra. The description of the injury, moreover, quite tallies with the condition of the specimen, so that this discrepancy cannot be accounted for by any mistake in its identity. It is important to note that this injury has been produced in a different way to that of the previous specimens. From the nature of the accident, the spinal column has probably been injured directly where the man struck his back, also indirectly by its having been bent backwards (not forwards, as in the previous cases).

B. C. 1. 4. M. 12.

3. 89. Old-standing Crushing Fracture of the first Lumbar Vertebra.—Sections of the last dorsal, first, and part of second lumbar vertebræ—macerated and dried, to show the above injury.

The accident happened by a weight of earth falling upon the man's shoulders, and although the spinal cord must have been compressed the patient survived the injury for "a considerable time."

The substance of the injured vertebræ seems to have been crushed backwards upon the spinal canal, but the parts have apparently been consolidated.

Figured in Bell's "Observ. on Injuries of the Spine and Thigh Bone," plate i. fig. 2.

B. C. 1. 4. M. 10.

3. 90. Old-standing Lateral Dislocation of the last Dorsal from the first Lumbar Vertebræ.—Lower six dorsal and upper four lumbar vertebræ, from a boy. The specimen is in spirit, and the muscles are cleaned off, and the spinal canal laid open from behind to show the results of the above condition.

He was knocked down by a stage-coach, and survived the accident eleven months, although quite paralysed in his lower limbs. He died of croup.

The vertebræ are completely dislocated laterally. The spinal cord is torn through, and its ends—indicated by bristles—are seen about $1\frac{1}{2}$ inch apart, embedded in fibrous tissue. Along the front of the preparation a mass of new fibrous tissue unites the bones.

Figured in Bell's "Observations on Injuries of the Spine and Thigh Bone," plate ii. figs. 2 and 3.

B. C. 1. 4. M. 9.

3. 91. Gunshot Injury of the Spine.—Bodies of two dorsal vertebræ—macerated and dried—showing a round bullet embedded at the back of one of them.

The injury was received in an encounter with smugglers. The ball perforated the lateral part of the bone, and was stopped by the longitudinal ligament, which it pushed out so as to destroy the spinal cord.

The bullet had evidently entered on the right side of the body, and passed backwards. It has penetrated, without fracturing, the cancellous tissue. B. C. XVII. 11.

FRACTURES OF THE THORAX.

FRACTURE OF THE STERNUM.

3. 92. Fracture of the Sternum.—Sternum and costal cartilages of an adult, partially cleaned—in spirit—showing a fracture near the lower end.

A stone fell and crushed the man's chest, breaking several ribs, about half-way round. The lung was compressed and bruised between

the sternum and vertebræ, and the œsophagus was also bruised. The man died shortly after admission to the Royal Infirmary, Edinburgh.

It should be noted that the bone, although broken, is not displaced, and the injury could not be seen from the front, nor, in fact, from the back either, until the soft parts were dissected off to show the fracture below. G. C. 3343.

Presented by A. G. Miller, F.R.C.S.E.

FRACTURES OF RIBS.

3. 93. United Fracture of Ribs.—Sternal ends of three ribs of an adult, with costal cartilages—macerated—showing a united fracture in each bone.

In each case there is some displacement. In two of the ribs the fracture has taken place about one inch, and in the third about two inches from the cartilage. W. C. G. 2.

3. 94. United Fracture of Ribs.—Two mid-left ribs of an adult—macerated—showing the above.

They were taken from the Acropolis of Athens.

The bones have been broken about their middle, and have united. From the seat of fracture of the lower rib a connecting mass of new bone extends to the upper rib in front of the broken spot. (This bridge of bone has been accidentally broken after death.) G. C. 2076.

Presented by Dr Hay, 1840.

FRACTURES OF THE CLAVICLE.

3. 95. United Fracture of the Clavicle—Right clavicle—macerated, showing the above.

The bone has been broken very obliquely about the middle, but has united, with no other displacement excepting that of over-riding. W. C. G. 8.

3.96. United Fracture of the Clavicle.—Right clavicle macerated, showing the above.

The bone has been broken obliquely about the middle, and has united with over-riding, and with some depression of the outer fragment. B. C. I. 1. M. 5.

3. 97. United Fracture of the Clavicle.—Plaster of Paris cast of a right clavicle, which had possibly sustained a fracture at the junction of the inner and middle thirds, with absorption at the fractured spot.

Absorption of this kind is, however, not common, and is difficult to explain. G. C. 3248.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1890.**

3. 98. United Fracture of the Clavicle.—Plaster of Paris cast of the rightclavicle of an adult, showing the above.

The break has occurred between the outer and middle thirds, and the union has taken place with distinct callous and some depression of the outer fragment. G. C. 3249.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1890.**

3. 99. United Fracture of the Clavicle.—Plaster of Paris cast of a left clavicle, showing the above.

The bone had been broken near the junction of the outer and middle thirds, and had united with considerable callous. G. C. 3093.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1889.**

3. 100. United Fracture of the Clavicle.—Left clavicle—macerated—showing the above.

The break has taken place obliquely near the junction of the outer and middle thirds. There is over-riding and distinct callous. B. C. I. 1. M. 6.

3. 101. United Fracture of the outer end of the Clavicle.—Plaster of Paris cast of a left clavicle, showing the above.

The bone has been broken through at the line of attachment of the trapezoid ligament. The outer fragment shows the characteristic displacement forwards without any depression.

G. C. 3251.

Presented by F. M. Caird, F.R.C.S.E.

FRACTURES OF THE SCAPULA.

3. 102. Ununited Fracture of the Acromion Process and United Fracture of the Vertebral Border.—Left scapula of an adult—macerated—showing the above.

The acromion process has been separated from the spine, and the margins of the bone are thickened where the pieces meet. The fracture at the inferior angle has extended to the vertebral border, and the pieces have united with considerable displacement. The injury to the acromion might, from the position and direction of the line of separation, have been an ununited epiphysis, but the raised margins of bone and the presence of a fracture at another part of the bone render the theory of fracture more probable. B. C. I. 1. M. 7B.

3. 103. Supposed Fracture of the Acromion Process of the Scapula.—Right scapula—macerated—showing an irregular groove between the acromion process and the rest of the bone.

This is possibly a late union of the epiphysis.

B. C. I. 1. M. 7.

FRACTURES OF THE HUMERUS.

3. 104. Recent Fracture through the Anatomical Neck with Comminution of the Bone below.—Outer portion of a

left scapula and the upper end of a humerus, with the muscles dissected off and the capsule laid open, so as to expose the joint from the front—in spirit—showing the above injury.

The patient, Mary Kidd, æt. 55, fell down some stone steps on Saturday night, December 29, 1827. When admitted to the Royal Infirmary, Edinburgh, on January 2, 1828, the following report was made:—"The whole of the left upper extremity is ecchymosed and much swollen; there is a distinct crepitus near the upper end of the humerus, and during the rotation of the bone the head remains motionless, the lower end of the bone is drawn in towards the chest, pulse 100 and feeble, belly costive, tongue furred, the pain at the upper part of the limb has been constantly upon the increase."

On the 4th of January the patient was observed to be labouring under the symptoms of delirium tremens; she had been constantly talking during the preceding night, and did not answer questions rationally; had much tremor of the hands, pulse 90, skin cool, tongue moist.

These symptoms continued with considerable variation and with occasional intermissions until about the 18th, when a considerable slough was observed on the sacrum and right buttock. This increased progressively notwithstanding the use of every means to protect the parts from pressure, and she expired on the 28th January.

The head of the bone has been separated along nearly the line of the anatomical neck, and the tuberosities and upper part of the shaft have been severely comminuted. This has probably been the result of a blow directly upon the shoulder.

G. C. 1100.

Presented by Sir GEORGE BALLINGALL.

3. 105. Recent Fracture through the Anatomical Neck with Comminution of the Tuberosities.—Upper end of a left humerus, with the muscles dissected off—in spirit—showing the above injury.

The head is separated by a fracture following the line of the anatomical neck, and the greater tuberosity is comminuted. This also has probably been the result of a blow directly upon the shoulder.

G. C. 2657.

Presented by Dr WATSON.

3. 106. Fracture through the Anatomical Neck and greater Tuberosity.—Head and tuberosities of a right

humerus, broken off irregularly from the shaft of the bone—macerated.

The patient, John Locke, æt. 64, fell over a parapet at Stockbridge, and besides this injury sustained a compound fracture of the elbow joint.

The arm was amputated at the shoulder joint a few hours after the accident by Sir George Ballingall, and the patient recovered without a bad symptom.

The fracture has passed between the anatomical and surgical necks on the outer side, and through the anatomical neck on the inner side of the bone, *i.e.* in a line corresponding to that of the epiphysial junction in a young subject. The rarification of bone round the seat of fracture makes it *appear* as if the patient had survived the injury for some weeks, and as if this piece had had a vascular supply. G. C. 744.

Presented by Sir George Ballingall.

3. 107. Fracture through the Anatomical Neck and greater Tuberosity.—Left humerus—macerated—showing the above injury.

The fracture, as in the previous specimen, has passed between the anatomical and surgical necks on the outer side, and through the anatomical neck on the inner side of the bone. There has been no union, but there are indications of periostitis on the upper piece at the outside, and on the lower fragment down nearly to the elbow joint. The patient had therefore probably survived the injury several weeks. G. C. 918.

Presented by Sir George Ballingall.

3. 108. United Fracture through the Anatomical Neck and greater Tuberosity.—Left humerus of an adult, probably a woman—macerated—showing the above.

The line of fracture has evidently been similar to that in the last two specimens, *i.e.*, between the two necks on the outer side, and along the line of the anatomical neck on the inner side. The broken bone has united without thickening, but

with distinct displacement. The upper fragment is tilted outwards and is rotated inwards. The articular surface of the head thus looks more backwards and less upwards than in a normal bone. The greater tuberosity recedes inwards from, instead of projecting beyond, the line of the outer surface of the shaft. The articular surface has been injured apparently *post mortem.* G. C. 3213.

3. 109. United Fracture through the Surgical Neck.—Right humerus—macerated—showing the above.

The line of fracture has passed through the upper part of the surgical neck. The upper fragment has been tilted outwards and rotated inwards in a way similar to that seen in the previous specimen. There is some irregularity in the bicipital groove and on the inner side, but the bone at the seat of fracture is quite smooth on the outside. G. C. 3214.

3. 110. United Fracture through the Surgical Neck.—Plaster of Paris cast of a left humerus, showing the above.

The line of fracture has apparently been at the upper part of the surgical neck, but the exact position is hidden by a considerable quantity of bone thrown out round about it.

G. C. 3253.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1890.**

3. 111. United Fracture through the Surgical Neck.—Plaster of Paris cast of a left humerus, showing the above.

The line of fracture has passed somewhat obliquely downwards and backwards from the bicipital groove. The upper fragment has been rotated inwards and tilted forwards so as to meet the lower fragment at an obtuse angle projecting forwards. The articular surface of the humerus is thus correspondingly altered in position. G. C. 3252

Presented by CHARLES W. CATHCART, F.R.C. E., **1890.**

3. 112. United Oblique Fracture through the Surgical Neck.—Right humerus—macerated—showing the above.

The line of fracture beginning behind about an inch below the head has run obliquely downwards and forwards for about two inches and a half. There is some overriding of the fragments, and the upper one is tilted forwards and outwards, and is rotated inwards. B. C. I. 1. M. 49.

3. 113. Recent Fracture of the Shaft.—Portions of a recently fractured humerus, sawn up and macerated. G. C. 336A.

Presented by Sir GEORGE BALLINGALL.

3. 114. Uniting Fracture at the Lower End of the Shaft.—Lower portion of a right humerus—partially macerated and in spirit—showing the above.

There has been a comminuted fracture in process of union. A large quantity of forming cancellous bone (provisional callous) surrounds the broken ends. G. C. 173.

3. 115. Recent Compound Fracture of the lower End.—Right upper limb of a boy aged six years—in spirit—showing severe laceration, which accompanied the above.

The boy's arm was run over by a heavy cart. The soft parts were greatly lacerated, and the bone split as well as fractured.

G. C. 2669.

Presented by W. FINLAY, F.R.C.S.E.

3. 116. United Oblique Fracture through the upper portion of the Shaft.—Left humerus—macerated—showing the above.

The line of fracture beginning behind about an inch below the head has run downwards and forwards for about three

inches and a half. The upper fragment is tilted slightly forwards, and is rotated inwards. B. C. I. 1. M. 50.

3. 117. Badly united Fracture through the upper part of the Shaft.—Right humerus—macerated—showing the above.

The upper fragment is rotated inwards, and is tilted forwards and outwards. The axis of the lower fragment has also been altered, so that the two pieces meet at an obtuse angle, directed outwards. They have united, but with considerable callous thickening between the broken ends.

B. C. I. 1. M. 48.

3. 118. Badly United Comminuted Fracture through the Upper End.—Left humerus—macerated—showing the above.

The upper portion has been split and comminuted, and of the fragments thus formed there are three main pieces, viz.—an anterior, bearing chiefly the bicipital groove; a posterior, bearing the head; and jambed between these two a smaller fragment on the inner side. The lower portion of the bone has a pointed upper extremity, and the appearances are such as might have been produced by the impaction of the lower portion into the upper, thus splitting and comminuting it. The bone has been in process of healing, but as the new bone is still porous, it has evidently not had time to consolidate.

G. C. 2784.

3. 119. United Fracture above the Insertion of the Deltoid.—Anterior half of the upper end of a left humerus—macerated—showing the above.

The broken ends of the bone have been displaced, so as to form with one another an obtuse angle, pointing forwards. There is very little thickening at the seat of fracture, and the medullary cavity has been restored. B. C. I. 1. M. 51a.

3. 120. United Fracture below the Insertion of the Deltoid.—Plaster of Paris cast of a left humerus, showing the above.

The lower fragment has been displaced somewhat in front, and to the inner side of the upper, and both have been tilted, so that at the point of junction the fragments form an obtuse angle, directed forwards and outwards. G. C. 3254.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1890.

3 121. United Fracture below the Insertion of the Deltoid.—Lower part of a right humerus, sawn in lateral halves, and macerated to show the above injury.

The lower fragment has been displaced forwards. New bone surrounds the broken ends, and the medullary canal at the seat of fracture is occupied by cancellated tissue.

W. C. G. 6.

3. 122. Badly United Fracture below the Insertion of the Deltoid.—Part of the shaft of a right humerus—macerated—showing the above.

The lower fragment is behind the upper. The two are united with much intervening callous at a very obtuse angle, the apex of which points outwards. G. C. 3450.

Presented by MACDONALD BROWN, F.R.C.S.E., 1892.

3. 123. Ununited Fracture at the Insertion of the Deltoid.—Plaster of Paris cast of the left humerus of David Livingstone, the great African missionary and traveller, showing the position of the ununited fragments.

Many years before his death, his arm had been crushed by a lion and the fracture had remained ununited.

The upper fragment has been considerably atrophied, and is rotated inwards. G. C. 2433.

Presented by Sir WILLIAM FERGUSON.

3. 124. Ununited Fracture at the Lower End of the Shaft.—Left humerus of an adult woman—macerated—showing the above.

The patient, aged 40, after having been treated in the Royal Infirmary, Edinburgh, for fractured humerus was discharged. On August 24, 1825, she was re-admitted for pain and a fluctuating swelling in the region of the fracture. Next day the swelling was incised, and a great quantity of thin, glairy fluid was discharged. On the 10th of September, symptoms of septicæmia appeared, the wound inflamed and suppurated, and on the 16th September she died suddenly, apparently much exhausted.

The adjacent surfaces of bone are smooth, but the provisional callous on the inner and front part seems to have united round the bone before death. The surface of the bone above and below the fracture is roughened and covered by new periosteal outgrowth in a way common in septic irritation.

This seems to have been a case of ununited fracture with serous exudation round the broken ends, and septicæmia following the incision. The small part of callous union probably occurred after the second admission to the Infirmary.

G. C. 1011.

3. 125. United Fracture above the Condyles.—Adjacent portions of the right humerus and ulna of an adult—macerated—showing the effects of the above injury.

The bone is broken about one and a half inches above the condyles. The lower fragment has been displaced forward, and over-riding has occurred.

Inflammation has ensued in and around the elbow joint, and this has led to alteration of the articular surfaces and anchylosis. B. C. I. 1. M. 47.

3. 126. United Fracture through the Coronoid Fossa.—Plaster of Paris cast of the lower end of the right humerus of an adult, showing the above.

The line of fracture has passed through the inner condyle,

across the olecranon and coronoid fossæ, and has terminated about half an inch above the outer condyle. G. C. 3092.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

FRACTURES OF THE RADIUS AND ULNA.

3. 127. Badly United Fracture of the Radius and Ulna.—Left radius and ulna of a young person—macerated—showing the above.

The bones have been united at a considerable angle, and there is callous thickening round the seat of fracture, especially on the radius.

The epiphyseal lines are apparent at the lower end of both bones on the dorsal aspect.

This has probably been a fracture of the radius and a green-stick fracture of the ulna. F. P. C. 74.

Presented by Professor JOHN THOMSON.

3. 128. Fracture of the Bones of the forearm, Radius ununited.—Bones of the right forearm of an adult macerated.

The ulna, fractured a little below the middle, is united in bad position. The lower fragment is displaced inwards from the upper, and is somewhat rotated inwards on its own axis. The head and styloid processes are greatly altered, apparently by arthritis deformans.

The radius has an ununited fracture about the middle. The broken ends are enlarged and irregular, and their contiguous surfaces are rough. At the lower end the radius has been broken about half an inch above the articular surface, and the lower fragment has been displaced outwards and backwards, but without much rotation backwards. The styloid process has, however, thus been raised above the level of that of the ulna. This injury might be called a form of Colles' fracture.

G. C. 3449.

Presented by MACDONALD BROWN, F.R.C.S.E.

3. 129. United fracture of the Radius between the attachments of the Pronator Radii Teres and Supinator Brevis.—Plaster of Paris cast of a right radius showing the above.

The fracture has united in a bad position in two ways. Besides a distinct angular deformity there has been a relative rotation of the two fragments; the upper is in supination, and the lower in pronation.

This latter deformity can only be prevented by treating the fractured limb in the supine position. G. C. 3089.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 130. Fracture of the Radius, below the Pronator Radii Teres.—Right radius—macerated—showing the above.

The fracture has been badly united. The ends overlap, and the upper fragment has been drawn inwards, and has evidently been united to the ulna, while the lower fragment is somewhat pronated. W. C. G. 17.

3. 131. Fracture of the Radius beween the Pronator Radii Teres and the Pronator Quadratus.—Longitudinal section through a right radius—macerated—showing the above.

The fragments overlap, and the lower one has been drawn inwards, and is pronated. The medullary canal where exposed on the overlapping fragments has been closed in, but it has not been re-established in the interior. F. P. C. 75.

Presented by Professor JOHN THOMSON.

3. 132. United Fracture of the Radius near its Lower End.—Skeleton of a left forearm—cleaned and dried, showing the above.

The radius at the seat of fracture, *i.e.* about two inches

above the lower end, is brought near the ulna. The articular surface for the carpus looks slightly backwards, and the styloid process has been displaced upwards. These alterations resemble those found in Colles' fracture, which, however, is usually at a lower level. The ulna at its lower end is bent away from the radius, and its styloid process projects unduly. G. C. 2785.

Presented by JOHNSON SYMINGTON, F.R.C.S.E.

3. 132a. Structure and Arrangement of Parts concerned in Colles' Fracture.—Skeleton of a left hand and wrist, and sections of a left radius, to illustrate the above. G. C. 3271.

Presented by JOHNSON SYMINGTON, F.R.C.S.E.

3. 133. Recent Compound Colles' Fracture.—Right hand and forearm of a young woman—in spirit, with the tendons dissected at the back, to illustrate the above.

The patient while drunk had been tripped up on the street. Acute septic inflammation ensued, and was followed by spreading gangrene, for which amputation through the upper arm became necessary. For many days after the amputation her life was in danger, but she ultimately made a good recovery.

The wound made by the lower end of the ulna is shown in front. The lower end of the radius has been comminuted and the styloid process of the ulna broken off. G. C. 3271.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 134. Badly united Colles' Fracture.—Skeleton of the left forearm of an old person—cleaned and dried, showing the above.

The radius has been fractured about half an inch above its lower end; the carpal articular surface has been forced backwards and upwards, and looks obliquely backwards. Its styloid process is now on a level with that of the ulna.

The carpus and lower fragment of the radius thus project

backwards and towards the radial side; the lower end of the upper fragment projects forwards. Owing to this and to the backward rotation of the lower fragment of the radius the usual hollow on the front of the lower end of the bone has disappeared.

The styloid process of the ulna relatively projects. The head is altered.

The olecranon process has been broken and is partially united. G. C. 2786.

Presented by JOHNSON SYMINGTON, F.R.C.S.E.

3. 135. United Colles' Fracture.—Skeleton of the left hand and forearm of an old woman—cleaned and dried, showing the above.

The patient was an old woman, the most of whose bones were in a condition of senile osteo-malacia.

The lower end of the radius has been rotated backwards, and has been forced to the radial side. The styloid process of the radius is on the level of that of the ulna. There were no adhesions either in the joints or in the synovial sheaths of the wrist. The flexor carpi ulnaris tendon is in its usual place.

G. C. 3220.

Presented by CHARLES W. CATHCART, Esq., F.R.C.S.E.

3. 136. United Colles' Fracture.—Bones of a left forearm—macerated—to show the above.

The lower end of the radius is displaced outwards and backwards, but with less rotation backwards than is usual. The lower fragment has probably been comminuted. The appearances are those of an imperfectly reduced Colles' fracture.

Sir Charles Bell describes this specimen as "a fracture of the radius near the wrist. This is a very common accident, and is apt to be mistaken for a dislocation or sprain."

B. C. I. 1. M. 53.

3. 137. United Colles' Fracture.—Right radius and ulna of an old woman—macerated, showing the above.

The displacement is comparatively slight. The styloid process of the radius is however slightly pushed upwards towards the elbow, and the articular surface looks now directly downwards in the axis of the bone, instead of, as normally, forwards. G. C. 3221.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 138. United Colles' Fracture.—Left hand of an adult dissected to show the relations of the tendons at the wrist after the above injury—in spirit.

The deformity is characteristic. The tendon of the extensor carpi ulnaris has been dislocated outwards, and lies external to the head of the ulna. In every other respect the tendons are in their normal position, and they are free from adhesions. G. C. 3219.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 139. Badly united Colles' Fracture.—Plaster cast of the left hand and part of the forearm of a man showing the characteristic deformity of a Colles' fracture.

The injury had occurred several years before the cast was taken, and the hand though deformed was quite useful. G. C. 3290.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 140. Badly united severe Colles' Fracture.—Plaster cast of a right hand and wrist from a case of Colles' fracture, produced in an unusual way.

The patient was a workman engaged at the building of the Forth Bridge. He was holding the lever of a punching machine, when it was allowed by accident to give his hand a sudden and violent thrust directly

backwards. In consequence the radius was broken. The fracture was at first enclosed in splints, without being reduced, and the patient was sent by the surgeon of the works to a surgeon in Edinburgh. The latter, on the supposition that the fracture had been set, left it in the splints, and lastly, the patient, by some mistake, did not return for six weeks to have the splints removed. In consequence the hand became practically useless. Refracture was found impossible, and massage did no good.

It will be observed that there is little or no lateral displacement. This confirms the view that the usual presence of lateral displacement is due to the direction of the breaking strain.

G. C. 3100.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 141. United Fracture of the Ulna.—Lower part of a right ulna, macerated, showing a fracture united with some displacement and considerable callous.

From the diminution of the articular surface the range of pronation and supination must have been greatly diminished.

B. C. I. 1. M. 54.

3. 142. United "Smith's" Fracture.—Right radius and ulna, carpus, and part of metacarpus—macerated, showing the above.

There has been a fracture through the lower end of the radius, just above the articular surface, with a displacement similar to that seen in Colles' fracture, only forwards instead of backwards. The styloid process of the radius is at a higher level than that of the ulna. The articular surface of the radius looks now very obliquely forwards. The normal hollow, just above the articular surface in front, is increased, while there is a marked projection at a corresponding place at the back. There are deep grooves on the back of the radius for the tendons of the extensor secundi internodii pollicis and the extensor indicis. This fracture is produced by a forcible bending of the hand forwards, *i.e.* in a direction the reverse of that in which Colles' fracture is produced.

G. C. 3551.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

3. 143. Compound Comminuted Fracture of the Hand and Forearm.—Shattered portions of the bones of the hand and forearm of a woman—macerated and mounted on a board to illustrate the above.

The arm was crushed by machinery, and was amputated at the shoulder but twenty-four hours after the accident. Suppuration set in, and extended below the pectoralis major and latissimus dorsi, and the patient died.

G. C. 1225.

Presented by Dr John Campbell, F.R.C.S.E., 1828.

GUNSHOT FRACTURES OF THE BONES OF THE UPPER LIMB.

3. 144. Gunshot Fracture of the Clavicle and Scapula.—Right scapula and outer part of clavicle—macerated, showing a bullet lodged in the supra-spinatus fossa, after having penetrated from the front.

"The musket ball is lodged in the back of the scapula. This I took from the body of Captain ———. The ball entered in the breast, broke the end of the clavicle, entered the chest, and went across the lungs, broke a rib upon the back part, stuck in the scapula, the spent ball being nearly divided in two by the spine of the scapula. I was present when he was brought ashore at Portsmouth in a very exhausted condition, and labouring in his breathing. He died the next day, which was the 12th from his receiving the wound. On opening the body I was astonished at finding the quantity of serum which poured out from the chest, as out of a barrel. The lungs were condensed and gorged with blood. He would have been much relieved by the operation of Paracentesis." See "Operative Surgery," 2nd edition, in the description of Plates IV. and XIII.

The spine and adjacent parts of the scapula have been splintered by the bullet. Its extraction would have been attended with great difficulty from its having a dumb-bell shape, with the neck lying in the aperture in the bone, and each end larger than the aperture. The sternal end of the clavicle has been splintered off.

B. C. xvii. 17.

3. 145. Gunshot Wound of the Chest and Scapula.—Oil

painting by Sir Charles Bell of Captain —— from whom the previous specimen was taken.

The painting shows where the bullet entered in front.

B. C. XVII. 18.

3. 146. Gunshot Wound of the Humerus.—Oil painting by Sir Charles Bell of a soldier, wounded as above at Corunna.

The ball struck the head of the os humeri, shattered it, passed through, and wounded a rib. Amputation was performed, but the patient sank from loss of blood.

B. C. XVII. 22.

3. 147. Gunshot Wound of the Head and Tuberosities of the Humerus.—Left humerus—muscles cleaned off and in spirit, showing the above.

Sir Charles Bell says: "This is the case which gave rise to my reflections on the propriety of the excision of the bone. The patient was one of those soldiers brought home from Corunna to Haslar Hospital, while I was there studying the subject. When I put my hand on this man's shoulder the bone felt like a bag of sand. 'Now,' said the operator, 'this we consider a proper case for amputation at the shoulder joint;' and he proceeded to the operation, which he performed with remarkable dexterity. But afterwards, when I had an opportunity of reflecting on a variety of the same class of cases, I saw the impropriety of this proceeding." (See "Operative Surgery," second edition, page 473, and the explanation of Plates iv. and vii.)

The head of the humerus is split off, and the tuberosities and upper part of the shaft are severely comminuted. One large fragment of the shaft has been loosened but not detached.

B. C. XVII. 21.

3. 148. Gunshot Wound of the Humerus.—Photograph from the drawing by Sir Charles Bell of the patient from whom the foregoing specimen was taken.

G. C. 3558.

3. 149. Gunshot Fracture of the Upper End of the Humerus.—Right humerus—macerated, showing the above.

Sir Charles Bell says: "I received a man who had got a musket shot through his shoulder at Brussels. The bones were shattered, and I resolved to make a free incision, and saw off the head of the humerus. I had proceeded so far as to extract the fractured portions, when I was called upon to consult by two inspecting surgeons who had that moment come into the room. They induced me to amputate at the shoulder joint, which I regretted, as it was against my own principles."

The bullet has split off a fragment, carrying the upper end of the bicipital groove, the lesser tuberosity, and the front of the greater tuberosity, and has thus freely exposed the cancellous texture at the back of the bone.

B. C. XVII. 20.

3. 150. Gunshot Fracture of Acromion Process.—Portions of the acromion process of a right scapula—macerated.

The portions are those which were extracted before amputation of the arm, the humerus of which forms the foregoing preparation.

B. C. XVII. 19.

3. 151. Excision of the Head of the Humerus for Gunshot Injury.—Plaster cast of the right arm and half of the neck and thorax of a soldier, on whom the above operation had been successfully performed.

Sir Charles Bell says: "This is the cast of the shoulder of a soldier who had suffered that operation, which I proposed as a substitute for the amputation of the shoulder joint. He had received a ball in the head of the humerus. The surgeon, instead of amputating, as in the former instances, made a free incision, and sawed off the shattered bit of bone. This was after my observations made at lecture and in publications. The surgeon, Mr———, brought this cast here to Windmill Street, on his return from America, and presented it to me as a practical example of the correctness of my doctrine. He afterwards communicated it to others."

B. C. XVII. 23.

3. 152. Gunshot Fracture of the Shaft of the Humerus.—Detached upper end of a left humerus—macerated, showing the above.

The patient was a soldier who fought at Waterloo.

The bone has evidently been comminuted as well as broken, and a fissure is seen in the bicipital groove. Near the seat of fracture are marks of inflammation, and a small piece of necrosed bone has been in process of separation.

F. P. C. 203.

Presented by Professor JOHN THOMSON.

3. 153. United Gunshot Fracture of the Upper Part of the Shaft of the Humerus.—Sections of the upper part of a right humerus—macerated, showing the above.

Chronic ostitis and periostitis have been present, and have led to enlargement and sclerosis of the upper part of the shaft. From the inner lip of the bicipital groove a mass of bone projects upwards and forwards. G. C. 669.

Presented by ADAM HUNTER, F.R.C.S.E., 1824.

3. 154. Recent Comminuted Gunshot Fracture of the Shaft of the Humerus.—Lower portion of a left humerus, shattered by a musket ball—macerated.

The patient was a soldier who fought at Corunna.

Amputation was performed, but Sir Charles Bell thought improperly so, as "the pieces ought to have been taken away by incision." (See Sir Charles Bell's "Operative Surgery," 2nd edition, p. 471.) The bone, where struck, has been broken in several large pieces, and one or two fissures run down into the lower fragment.

B. C. XVII. 24.

3. 155. Gunshot Wound of the Humerus.—Oil painting by Sir Charles Bell of the patient, before amputation, from whom the foregoing specimen was taken. B. C. XVII. 25.

3. 156. Gunshot Fracture of the Shaft of the Humerus.—Lower half of a left humerus—macerated, showing the effects of septic osteo-myelitis following the above.

The patient was a soldier who was wounded at Waterloo.

The bone at the seat of fracture has necrosed, and has been in process of separation. Lower down the opening up of the vascular channels shows that there has been inflammation of the periosteum, although not with the formation of any new bone. F. P. C. 205.

Presented by Professor JOHN THOMSON.

3. 157. Gunshot Fracture of the Shaft of the Humerus.—Portion of a humerus—macerated, showing the effects of the above.

The patient was a soldier who fought at Waterloo.

There has evidently been septic osteo-myelitis. A portion of the bone, smoother and whiter than the rest, has necrosed. At other places new bone has been thrown out from the broken surface of the bone, from the periosteum, and in the medullary cavity. F. P. C. 204.

Presented by Professor JOHN THOMSON.

3. 158. Old-standing Gunshot Fracture of the Lower End of the Humerus.—Lower end of a left humerus—macerated, showing the effects of the above.

The wound was received at Waterloo by a soldier who fought there. He sank exhausted by hectic fever and diarrhœa thirteen months after the battle.

This specimen was figured in Hennen's "Military Surgery," 2nd edition, plate i. fig. 3, as an illustration of the bad effects of the impaction of a fragment of bone into the medulla; also of Nature's attempt to bridge over the injured part by new bone formation. The features of the specimen would, however, be now explained by septic inflammation of the bone and soft parts, with subsequent reparative changes.

There has been considerable thickening at the seat of fracture. The broken ends are separated by a considerable interval, which is bridged over by two necks of bone. A fragment lies embedded, but movable, at the place where these two necks blend with the upper part of the shaft. F. P. C. 207.

Presented by Professor JOHN THOMSON.

3. 159. Old-standing Gunshot Fracture of the Shaft of the Humerus.—Oil painting by Sir Charles Bell, showing the above.

The patient was an officer, who fought at the battle of Waterloo.

The painting was made two years after the injury had been received. Necrosis had taken place. B. C. XVII. 26.

3. 160. Gunshot Fracture through the Lower End of the Humerus.—Lower end of a left humerus—macerated, showing the effects of the above, some time after receipt of the injury.

The patient was wounded at Waterloo.

Some fragments of white necrosed bone are seen at the broken margin. They have been in process of separation, and the bone below shows signs of periostitis. F. P. C. 206.

Presented by Professor JOHN THOMSON.

3. 161. Gunshot Injury of the Elbow.—Oil painting of the arm of an officer, by Sir Charles Bell.

He "came to me to have his arm amputated. A musket ball is lodged in the elbow joint, the nerves were cut, and the arm asleep, shrunk, and cold."

B. C. XVII. 27.

3. 162. Abscess in the Shaft of the Humerus following Gunshot Injury.—Section of the lower end of a right

humerus—macerated, showing expansion of bone near the lower end.

Some years before the preparation was obtained the bone had been fractured by gunshot.

The bone is expanded, and the cavity, about three inches from the lower end, is smooth, probably the result of a slowly forming abscess. B. C. XVII. 28.

3. 163. Shattering of the Hand from the Explosion of a Gun.—Skeleton of the left hand and lower part of the fore-arm of a young man—macerated, showing the above.

In consequence of the bursting of a fowling-piece, his hand was shattered, and a primary amputation through the fore-arm was performed. From this the patient made a good recovery.

The first phalanx of the thumb has been injured; the last and part of the second phalanx of the third finger, as well as the whole of the little finger, except the base of its metacarpal bone, have been lost (perhaps blown away). Every carpal bone except the trapezium and semi-lunar has been fractured.

G. C. 917.

Presented by Sir GEORGE BALLINGALL.

3. 164. Shattering of the Hand from the Explosion of a Gun.—Lower ends of a left radius and ulna, with remains of carpus and metacarpus, showing the above.

The subject, William Gardner, aged 19, received the injury by the bursting of a fowling-piece on 8th May 1828.

The metacarpal bones of the left hand were fractured near their carpal extremities; their heads, with the exception of that of the thumb, were dislocated at their articulation with the bones of the carpus, the anterior row of which was very much exposed and loosened from its connections with the other; the soft parts on the back, but particularly on the palm of the hand, were extensively lacerated; hæmorrhage trifling.

See Sir George Ballingall's Clinical Lecture, No. 4, page 6.

G. C. 1118.

Presented by Sir GEORGE BALLINGALL.

FRACTURE OF THE PELVIS.

3. 165. United Fracture through the Ala of the Ilium.—Pelvis of an adult man—macerated, showing the above.

The ala of the left ilium has been broken across, and there has been a great deposit of new bone along the line of fracture.

B. C. 1. 1. M. 1.

FRACTURES OF THE FEMUR.

3. 166. Attachment of the Capsule of the Hip Joint to the Femur.—Upper end of a femur—muscles dissected off—in spirit, showing the above.

The reflected portions of ligament which run along the neck towards the head are well shown. They carry blood-vessels, hence, when they are torn through in intra-capsular fracture, the nutrition of the upper fragment is seriously impaired. G. C. 3552.

Presented by JOHNSON SYMINGTON, F.R.C.S.E., **1893.**

3. 167. Structure of the Upper End of the Femur.—Transverse section through the upper end of a femur—macerated, showing the above.

This view shows the relations of the neck as bearing upon impaction. G. C. 3553.

Presented by JOHNSON SYMINGTON, F.R.C.S.E., **1893.**

3. 168. Recent Intra-capsular Fracture of the Neck.—Upper part of the left femur of an adult—macerated, showing the above.

The line of fracture is very irregular, and several pieces of bone are wanting along its anterior and upper part. The outer fragment seems to have been impacted into the inner or head

fragment, the interior of which has a crushed look, and shows at the front a small impacted fragment still in position.

G. C. 637.

Presented by JOHN HENRY WISHART, F.R.C.S.E.

3. 169. Somewhat recent Intra-capsular Fracture of the Neck.—Upper end of the left femur of an adult—macerated, showing the above.

The line of fracture has been nearly vertical. Thus above it has begun close to and involves the head, and below it has passed out on the neck. Several pieces of bone are wanting at the upper part of the line of fracture. From the roughness of the front of the neck it would appear that the patient survived the injury for some weeks. There is some absorption on the front of the upper fragment, but there has been no attempt at union.

G. C. 727.

3. 170. Somewhat recent Intra-capsular Fracture of the Neck.—Head and part of the neck of a femur detached by the above form of fracture—in spirit.

The patient lived six weeks after the accident.

The line of fracture has been oblique, passing close to the head above, and leaving a portion of the neck below.

B. C. 1. 1. M. 13.

3. 171. Somewhat recent Intra-capsular Fracture of the Neck.—Upper end of the left femur of an adult—muscles partly cleaned off—in spirit.

The patient lived for six weeks after the accident.

The broken surfaces of the cancellated tissue are covered with lymph, but there is no appearance of union.

G. C. 2658.

Presented by Dr WATSON.

3. 172. United Intra-capsular Fracture of the Neck.—Posterior half of the upper end of a right femur, muscles dissected off—in spirit, showing the above.

"An enfeebled lady, aged 77 (November 1821), in attempting to walk from her bedroom to an adjoining apartment, slipped her foot suddenly and unexpectedly over the ledge of a landing of a flight of stairs, and immediately fell on the right hip. She attempted to rise, but found that she had completely lost the power of motion in the limb of that side. Her servants, on coming to her assistance, found her sitting on the landing-place, her feet resting on the step below. She was immediately conveyed to bed, but being in comparatively little pain, and it being late in the evening, no medical assistance was required till next morning. I found her in the position in which she had remained during the night, resting upon her back, the right limb a little bent and apparently shortened about an inch and a half, the knee and toes considerably everted, the heel resting in the hollow between the ankle and the tendo-achilles of the left leg. She made no complaint, but of inability to move the leg, but all attempts to rotate the thigh occasioned considerable pain in the situation of the trochanter major, as did also the extension of the limb to bring the malleoli-interni together, which was readily accomplished, but retraction immediately took place, and the leg returned to its original position. No crepitus could be distinguished. Judging from the history and appearances of the case, fracture of the neck of the femur had taken place, and her friends were apprised of the helpless state to which, in all probability, she would be reduced, from no complete re-union being expected. The treatment was therefore very simple. The upper part of the thigh was frequently fomented; a broad firm bandage was constantly worn from the knee along the thigh and encircling the body. The limb was supported with pillows, and every attempt made to keep it extended, and the heel in apposition. Under this plan, she remained about five months, occasionally changing from her bed to a sofa. She then began to make some partial use of the leg, and, with the assistance of crutches and gently resting on the toes, she was enabled to move through the room. She ultimately laid aside the crutches, and walked with the assistance of a stout stick. She also, by and by, relinquished the use of the stick, and with the aid of a very high-heeled shoe she was enabled in the course of a year to walk with great facility through her house, and for more than a twelvemonth before her last illness to descend and ascend daily from one flat of her house to another to and from dinner, the knee and foot continuing considerably turned out, and the leg shortened upwards of an inch. In November 1823 she was seized with an affection of the brain, which proved fatal in April 1824."

This would seem to have been an impacted intra-capsular fracture of the neck of the femur, for the following reasons, viz. 1. The injury was apparently calculated to produce

impaction. 2. Crepitus, although looked for, was absent immediately after the accident, although against this it is right to set the shortening, which could apparently be overcome. 3. The great shortening of the neck and its impaction into the head are distinctly seen, especially above, while there is no appearance of impaction of the neck into the great trochanter. As is usual in impaction near the head, the outer fragment has been driven into the inner one. The capsule seems thickened. The lower fragment has been everted, and the trochanter is almost on a level with the head. The bone is condensed in the head and at the line of fracture. G. C. 746.

Presented by JAMES BEGBIE, F.R.C.S.E., **1825.**

3. 173. United Intra-capsular Fracture of the Neck.—Anterior half of the preceding specimen, muscles dissected off—in spirit, showing the above.

In addition to indications of impaction seen also in the previous specimen, this one shows in another way the eversion which was present. The head has been pushed back from the front of the neck, thus allowing the upper end of the lower fragment to project in front. The front of the capsule seems also thickened. In both specimens the cartilage covering the head is seen to be eroded as in arthritis deformans.

G. C. 746. a.

Presented by JAMES BEGBIE, F.R.C.S.E., **1825.**

3. 174. United Intra-capsular Fracture of the Neck.—Anterior half of the upper end of a right femur—muscles cleaned off, and in spirit, showing the above.

The line of fracture within the capsule is quite distinct. There has been shortening and eversion, but not impaction. The cancellated tissue has been re-formed, except at the lower part of the neck, where the new bone is condensed. G. C. 2461.

Presented by WM. SANDERS, F.R.C.S.E.

3. 175. United Intra-capsular Fracture of the Neck.—Posterior half of the foregoing specimen—muscles cleaned off, and in spirit.

This section shows points similar to those seen in the previous specimen. G. C. 2462.

Presented by W. Sanders, F.R.C.S.E.

3. 176. United Intra-capsular Fracture of the Neck.—Upper part of the right femur of an old man—macerated, and sawn transversely through the head and neck to show the internal structure.

The patient was a man aged seventy.

There is complete osseous union and restoration of the cancellous tissue, but with shortening and marked eversion.

The specimen, which resembles the previous one, belonged to Mr John Lizars, and is referred to in his "Practical Surgery," part i. p. 145. G. C. 3268.

3. 177. United Intra-capsular Fracture of the Neck of the Femur.—Plaster cast of the previous specimen, before section. G. C. 2781.

Presented by Charles W. Cathcart, F.R.C.S.E., 1888.

3. 178. United Intra-capsular Fracture of the Neck.—Sections of the upper end of the left femur of an old lady—macerated, and showing the above.

The neck has given way within the capsule. The trochanter is higher than the head, and the neck is shortened. The lower fragment has been somewhat everted. The internal structure of the bone cannot be properly studied on account of the presence of adipocere. G. C. 2268.

Presented by P. Newbigging, F.R.C.S.E.

3. 179. Ununited Intra-capsular Fracture of the Neck.—Upper end of the left femur of an adult—muscles dissected off and in spirit, showing the above.

The upper fragment is irregular and unchanged. Some absorption has occurred at the broken margin of the lower fragment, and the capsular ligament is greatly thickened.

F. P. C. 86.

3. 180. Ununited Intra-capsular Fracture of the Neck.—Anterior section of the upper end of the right femur of a woman, muscles dissected off—in spirit, showing the above.

The patient lived for two months after the injury.

The capsule is greatly thickened. The neck of the bone is absorbed, and the broken surfaces, which are covered by a soft material, fit into one another, the lower being slightly convex and the upper concave. A few ligamentous bands unite the broken margins in front.

Figured in Bell's "Observations on Injuries of Spine and Thigh Bone," plate vii. fig. 3.

B. C. 1. 1. M. 14.

3. 181. Ununited Intra-capsular Fracture of the Neck.—Upper end of a right femur, the muscles partly cleaned off—in spirit, showing the above.

The capsule is thickened; the bone has been absorbed on the adjacent surfaces of both fragments, and ligamentous bands connect the margins of the fractured surfaces. G. C. 174.

Presented by WILLIAM NEWBIGGING, Esq.

3. 182. Ununited Intra-capsular Fracture of the Neck.—Anterior half of the upper end of the left femur of an adult, muscles and ligaments cleaned off—in turpentine, showing the above.

There has been absorption of the neck, and the broken

surfaces, which are alternately slightly concave and convex, are united by fibrous bands. Some new bone has been thrown out round the broken margin of the lower fragment, and a small nodule is seen at the top, attached by fibrous tissue. There is a slight amount of bony enlargement on the lower portion of the head, which constitutes the upper fragment.

B. C. 1. 1. M. 15.

3. 183. Ununited Intra-capsular Fracture of the Neck.—Posterior half of the upper end of the left femur of an old man, muscles cleaned off—in spirit, showing the above.

The case was considered by some surgeons to be one of unreduced dislocation of the femur. Sir Charles Bell in consultation confirmed the diagnosis of fracture of the neck of the femur, and this was afterwards verified by *post-mortem* examination.

The patient lived for two years after the accident.

The capsule of the hip joint has been greatly thickened, and the neck of the bone has been almost entirely absorbed. Fibrous tissue unites the broken surfaces which are flattened. The cartilage covering the head of the bone shows the changes usually found in arthritis deformans.

Figured in Bell's "Observations on Injuries of Spine and Thigh Bone," plate viii. fig. 1.

B. C. 1. 1. M. 19.

3. 184. Ununited Intra-capsular Fracture of the Neck.—Left half of the pelvis of an adult, with the head of the femur fixed in the acetabulum—macerated, to show the above.

The portion of the femur remaining includes only part of the head, but possibly the bone was absorbed after the fracture. The exposed surface, somewhat irregular in outline, is for the most part smooth and condensed. Around the acetabulum new bone has been formed at one or two places. There are fissures on the ilium, but these may have been made *post mortem*.

G. C. 1013.

3. 185. Somewhat recent Extra-capsular Fracture of the Neck, without splitting of the Great Trochanter.—Upper end of a right femur—macerated, showing the above.

The specimen was taken from a subject in the dissecting-rooms. The patient had probably survived the injury for several weeks.

The line of fracture is just within the capsule in front, but is outside of it behind. The lesser trochanter is wanting. New periosteal bony growth is seen on the front of the neck, especially on the lower fragment, and other evidences of periostitis can be traced for several inches down the shaft. Some absorption has taken place in the interior. The fracture has apparently been produced by a fall on the trochanter, with a force sufficient to detach the neck from the rest of the bone, and to break off the lesser trochanter, but not sufficient to split the greater trochanter by crushing it in upon the root of the neck. G. C. 2774.

Presented by M'Donald Brown, F.R.C.S.E.

3. 186. Somewhat recent Impacted Extra-capsular Fracture of the Neck.—Upper end of a right femur—macerated, showing the above.

From the periosteal new bone thrown out at the upper end of the shaft of the femur, the patient has evidently survived the accident for several weeks.

The neck has given way at its junction with the great trochanter, and the latter has been comminuted by the impaction of the neck into it. The locking of the neck into the fragments of the trochanter has been undone, probably in the preparation of the specimen.

In the printed Catalogue published in 1836 this specimen was taken to be that numbered in the Bell Catalogue, I. 1. M. 18, and figured in Bell's "Observ. on the Spine and Thigh Bone," pl. viii. fig. 4. It does not however correspond to the description of that specimen, and has been entered afresh in the G. C. as 3275.

3. 187. Recent Impacted Extra-capsular Fracture of the Neck.—Upper end of a right femur—muscles cleaned off, and in spirit, showing the above.

The patient, a man aged 70, fell from a bed a foot and a half high, and struck his hip. There was eversion, but no shortening. He died in six days at Montrose Infirmary.

The neck has given way at its junction with the trochanters. The small and the posterior and upper part of the great trochanter have been split off from the shaft by impaction. A few tags of fibrous tissue still unite the neck to the upper part of the shaft and to the detached fragments. G. C. 1743.

Presented by W. A. F. Browne, **1835.**

3. 188. Recent Impacted Extra-capsular Fracture of the Neck.—Upper end of a left femur—muscles dissected off, and in spirit, showing the above. Some of the pieces are opened out at the back, to show the relations of the fragments.

A pensioner, aged 80, when intoxicated, slipped and fell on the floor. "He violently refused to have the injury examined or any remedy applied," and died on the twelfth day after the fall.

Unorganised lymph and decolourised blood-clot cover the broken surfaces of bone. The mode of comminution is similar to that seen in the previous specimens. G. C. 1300.

Presented by Wm. Brown, F.R.C.S.E.

3. 189. Somewhat recent Impacted Extra-capsular Fracture of the Neck.—Upper end of the left femur of an adult, —muscles dissected off, and in spirit, showing the above. Some of the pieces are opened out at the back to show the relations of the fragments.

The patient, who was under 50 years of age, was thrown violently to the ground, falling upon the point of the trochanter. He died of a chronic disease.

The great and small trochanters are split in a way quite analogous to that seen in the previous specimen, except that the injury is more severe.

The broken surfaces are covered with lymph, or forming fibrous tissue. The capsular ligament is considerably thickened.

G. C. 1474.

Presented by Alexander Simpson, F.R.C.S.E., **1832.**

3. 190. Extra-capsular Impacted Fracture of the Neck, uniting.—Upper end of a left femur—macerated and varnished, showing the above.

The patient lived for three months after the injury, and the toes were said to have been "inverted." Since, however, the linea aspera is in line with the head, this must have been a misprint for "everted."

The neck has given way, as usual, at its junction with the trochanters, and these, in turn, have been detached from the shaft, and severely comminuted by the impaction. There has been no union, but new periosteal bone has been formed round the upper part of the shaft and on the fragments of the trochanters. The neck shows some erosion, but no new bone formation.

G. C. 174. a.

Presented by Professor J. W. Turner.

3. 191. United Extra-capsular Fracture of the Neck.—Upper end of a left femur—macerated and varnished, showing the above.

The neck has given way at the usual place, and its anterior broken border is in front of the upper end of the shaft.

The upper and back part of the great trochanter and the lesser trochanter have been detached in one piece from the top of the shaft.

The axis of the neck is horizontal. There has been an unusually great shortening, but very little rotation either way. The greater part of the head and adjacent neck have been absorbed.

It will be observed that while there is much new periosteal bone upon the upper part of the shaft, there is much less upon

the detached fragment bearing the small and part of great trochanters, and little or none, only absorption, upon the head and neck. B. C. I. 1. M. 20. b.

3. 192. United Extra-capsular Fracture of the Neck.—Upper end of a left femur—muscles dissected off, in spirit, showing the above. A portion has been sawn out from the head and neck, to show the bony union.

As in the previous specimen, the anterior part of the neck has been thrust in front of the upper part of the shaft. The great trochanter is splintered much in the usual way. There has been shortening and eversion. G. C. 3280.

3. 193. United Impacted Extra-capsular Fracture of the Neck.—Sections of a right femur—macerated, showing the above.

The patient was a woman aged 77. The fracture occurred in March 1886, when she was 71 years of age. She was successfully treated in Professor Chiene's ward, Royal Infirmary, Edinburgh, and died in the Workhouse in April 1892.

The bone shows the usual appearances produced by a slight amount of impaction of the neck upon the trochanters. The shortening and eversion must have been very slight. The cancellous tissue has been re-established, but at one or two places it was replaced by fat. G. C. 3383.

Presented by G. M. Johnston, M.D.

3. 194. United Extra-capsular Fracture of the Neck.—Anterior half of the upper end of a right femur—macerated, with a plaster cast of the posterior half of the same specimen.

Four years before death, the patient, an old lady aged 71, fell on the carpet in her room, and immediately afterwards suffered from pain and powerlessness of her right limb. She was seen by Drs John Duncan and R. A. Lundie, who recognised "the usual symptoms of unimpacted extra-capsular fracture of the femur. It had none of the symptoms of

an impacted fracture." After six weeks of treatment by long splint and extension, the bone seemed united, but a starch bandage was applied and kept on for some time afterwards as an extra security. In a year or so she had as good use of her limb as she had had before.

The bone shows the usual appearances produced by a slight amount of impaction of the neck upon the trochanters, *i.e.* some thickening at the front of the neck and some splitting at the back of the great trochanter. The eversion must have been very slight, and there seems to have been no shortening at all, possibly owing to the extension used in the treatment. The anterior half shows that the cancellous tissue has been reformed with even less indication of fracture than in the previous specimen.

G. C. 2905.

Presented by R. A. Lundie, F.R.C.S.E.

3. 195. United Impacted Extra-capsular Fracture of the Neck.—Right femur of an old person—macerated, showing the above.

The specimen was taken from a subject in the Dissecting Rooms.

The neck has been impacted upon the trochanter, with the usual splitting, and has united. The union, however, has taken place in an unusually oblique position, so that the neck is almost in line with the shaft, and is raised well above the trochanter. The bone is exceedingly light and soft.

G. C. 3333.

Presented by Macdonald Brown, F.R.C.S.E.

3. 196. United Impacted Extra-capsular Fracture of the Neck.—Sections of the upper end of a left femur—macerated, showing the above.

The patient, a man aged 40, fell from the top of a loaded carrier's cart on to the causeway. Drs D. Clarke and Abercromby diagnosed a fracture of the neck of the femur from the shortening, eversion, and crepitus, and sent him into Hospital, where he was treated with the double-inclined plane. The shortening and eversion remained, but he

was able to go about, wearing a high-heeled boot, and with the aid of a stick. Five years after the injury the man died of some pulmonary affection.

The signs of impaction and splitting seen in the previous specimens are here well marked, and there has been considerable shortening and eversion. The restoration of the cancellous tissue without indication of the line of fracture is quite complete. G. C. 722.

Presented by Dr Clarke, **1824.**

3. 197. United Impacted Extra-capsular Fracture of the Neck, with Chronic Ostitis of the Shaft.—Right femur of an elderly person—macerated, showing the above.

There has been much eversion and considerable shortening. The whole shaft of the bone is thickened and increased in weight. The great trochanter has been split by the impaction upon it of the neck, but there is nothing in the specimen to indicate whether the ostitis has followed the fracture or was there when the bone was broken. B. C. 1. 1. M. 33. h.

3. 198. United Impacted Extra-capsular Fracture of the Neck.—Right femur of an old person—macerated, showing the above.

The great trochanter has been split by the impaction of the neck upon it, as in the previous specimens. There has been marked shortening and eversion. The bone is very light, and there seems to have been a process of absorption going on in the head of the bone. F. P. C. 582.

3. 199. United Impacted Extra-capsular Fracture of the Neck.—Anterior half of the upper end of the right and posterior half of that of the left femur of an elderly person—macerated, to show the effects of a healed fracture on the right side.

The fractured specimen shows the impaction of the neck upon the trochanter. The neck has given way at the usual place, but its anterior broken margin, instead of, as in Nos. 3. 191 and 192, being forced in front of the corresponding margin of the lower fragment, has been forced behind it, so as to be embedded in the upper end of the bone. These two modes of union thus each leave a ledge at the line of junction in front. It is more usual, however, to find an angle there—see Nos. 3. 193 to 198.

The section of the bone shows the restoration of the cancellous tissue except at two points, above and below, where the bone is condensed. The tip of the trochanter is on a somewhat higher level than that of the head. The section of the sound side shows a certain amount of absorption of the cancellous tissue due to old age, but the angle of the neck seems in no way altered.

G. C. 3662.

Presented by H. Alexis Thomson, F.R.C.S.E., 1892.

3. 200. United Impacted Extra-capsular Fracture of the Neck.—Upper end of a right femur—macerated, showing the above. A section has been made of the head and neck to show the interior of the bone.

The neck has given way, as is usual in this fracture, at its junction with the shaft. The small trochanter has been split off.

The tip of the great trochanter is above the level of the head, and the linea aspera is directed inwards, hence there must have been marked shortening and eversion.

The head of the bone shows changes like those produced by arthritis deformans, a disease which often attacks injured joints in old people. The bony union is complete. As in the previous specimen, the upper fragment has been forced behind the lower, leaving a similar ledge shelving backwards from the lower fragment to the upper.

This specimen is figured in Bell's "Observations on Injuries of Spine and Thigh Bone," plate vii. fig. 2.

B. C. 1. 1. 20. a.

3. 201. Ununited Extra-capsular Fracture of the Neck.—Upper end of a left femur—macerated, showing the above.

The neck of the bone has apparently given way nearer to the head than usual, but there has been the characteristic splitting of the great trochanter by impaction of the neck into it. Much new bone has been thrown out from the upper part of the shaft behind, below, and especially in front. The majority of the smaller fragments have united to one another and to the main piece only by fibrous tissue. The upper fragment, consisting of the head and part of the neck, has no new bone formed upon it, and its broken margin is quite sharp, except where it has been mechanically worn against the upper part of the shaft. Above this worn part the surface of the bone shows some superficial erosions, as if granulation tissue had been absorbing it. The want of formative power in this upper fragment is probably due to insufficient vascular supply, a condition which so often leads to non-union in the intra-capsular variety of fracture. See No. 3. 179. G. C. 998.

3. 202. Ununited Extra-capsular Fracture of the Neck.—Upper end of a left femur—muscles cleaned off, in spirit, showing the above.

The patient survived the injury several years. During the patient's life there was difference of opinion among several surgeons as to the exact nature of the injury. The case was originally treated as one of fracture of the neck, but some afterwards held that it was an unreduced dislocation. Sir Charles Bell in consultation confirmed the diagnosis of fracture, and this view was verified at the post-mortem examination.

The fracture has the usual characters as to the giving way of the neck and splitting of the trochanters. The fragments are united by firm fibrous tissue, and the leg has been considerably shortened and everted. B. C. I. 1. M. 20.

3. 203. Ununited Impacted Extra-capsular Fracture of the Neck, with great Displacement.—Last three lumbar

vertebræ, pelvis, and femora—macerated, showing the above. The bones on the fractured side are placed in the position in which they were found on dissection.

The fracture is of the impacted extra-capsular variety. It will be seen that the great trochanter has been split, and that one of the fragments, along with the shaft of the bone, has been drawn up to the crest of the ilium. The head and neck remain in their normal position. B. C. 1. 1. M. 17.

3. 204. Ununited Impacted Extra-capsular Fracture of the Neck, with great Displacement.—Plaster of Paris cast of a left innominate bone, and the upper end of the corresponding femur, showing the above.

As in the last specimen, the great trochanter has been drawn up to the crest of the ilium. The connection between the upper end of the shaft and the ilium was not composed of bone, as it seems to be in the cast. The appearance of bony union is due to a fault in the cast.

Copied by permission from a specimen in Dr Joseph Bell's collection. G. C. 3088.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 205. United Extra-capsular Fracture and Ununited Intra-capsular Fracture of the Neck, with Arthritis Deformans.—Upper end of a right femur—macerated, showing the above.

The appearances presented by this specimen are remarkable and unusual. The lower fragment at its upper end has all the appearance of a healed impacted extra-capsular fracture, of the type seen in Nos. 3.199 and 3.200, to the latter of which it has a considerable resemblance. But there is also an ununited fracture of the neck, as well as changes in the upper fragment, such as are produced by arthritis deformans. It is highly probable that arthritis deformans followed the impacted extra-

capsular fracture, and that, last of all, the neck was broken close to the head. The adjacent surfaces of both fragments are very irregular, but have been rounded off by vital processes.

This specimen is figured in Bell's "Observations on Injuries of the Spine and Thigh Bone," plate viii. fig. 3.

B. C. I. 1. M. 16.

3. 206. United Oblique Fracture above the Small Trochanter.—Upper end of the shaft of a right femur, with a section through the head and neck, to illustrate the above—macerated.

The specimen was taken from a subject in the Dissecting Rooms.

The head, neck, and great trochanter have been split off from the small trochanter and shaft. The upper fragment has been tilted outwards, but not forwards. This displacement is probably dependent upon the direction of the obliquity of the fracture, which has run from within outwards and downwards, leaving the psoas and iliacus muscles upon the lower fragment.

The spaces seen in the interior of the bone were filled by a brown, jelly-like material. Bony union has been complete.

G. C. 3255.

Presented by JOHNSON SYMINGTON, F.R.C.S.E.

3. 207. United Oblique Fracture above the Small Trochanter.—Upper end of a right femur, head and neck wanting —macerated, to illustrate the above.

The line of fracture has begun at the back, about one inch above the small trochanter, and has thence passed obliquely downwards and forwards for three or four inches. In this specimen also the direction of the obliquity has apparently determined the displacement.

The head, neck, and great trochanter have been obliquely split off from the shaft and small trochanter. The upper fragment is tilted forwards, and the two over-ride.

G. C. 2276.

3. 208. Comminuted Fracture of the Upper End of the Shaft and Great Trochanter.—Upper end of a right femur—macerated, showing the above. A portion of the head has been sawn off, for convenience in mounting.

The patient was a coachman. "He was in the act of pulling up his horses, when the foot-board broke, and he was precipitated, with his weight falling in the line of the thigh-bone. The urethra was burst." He lived for six weeks all but two days.

The head, neck, and front portion of the upper end of the shaft form one fragment, which projects forwards. The trochanters, and a splinter of about four inches of the back of the shaft, form another fragment, which in its turn is somewhat comminuted above, while the remainder of the shaft forms the lower fragment.

Much new bone has been formed from the upper end of the shaft, some from the trochanteric fragment, and only a very little from the head and neck fragment.

This specimen is figured in Bell's "Observations on Injuries of the Spine and Thigh Bone," plate vii. fig. 1.

B. C. 1. 1. M. 20. c.

3. 209. United Fracture below the Small Trochanter.—Plaster of Paris cast of the upper end of a right femur in the Barclay Collection, showing the above.

There had been firm, osseous union. The upper fragment has been tilted much forwards. The lower fragment has been drawn up, but neither fragment has been rotated.

G. C. 3281.

3. 210. Structure of the Shaft of the Femur.—Longitudinal section of a right femur—macerated, to illustrate the above.

The specimen shows the relative proportion of cancellous and compact tissue in the shaft and at the extremities.

G. C. 3559.

3. 211. Recent Fracture at the Lower End of the Shaft.—Lower end of a right femur—macerated, showing the above.

The line of fracture is irregularly transverse, and there has been some comminution at the inner side.

The periosteum indicates some previous inflammation. The compact tissue of the shaft is extremely dense, and is increased in thickness at the expense of the medullary cavity. The weight of the bone is abnormally great. G. C. 762.

MODE OF UNION IN FRACTURES OF THE SHAFT.

3. 212. Recent Oblique Fracture of the Shaft in a previously Diseased Femur.—Right femur — macerated, showing the above.

The fracture has occurred at the junction of the middle and lower thirds, and is somewhat spirally oblique from behind downwards and forwards. The edges are sharp, as if sufficient time had not elapsed for union. The whole shaft is irregularly thickened, as by syphilitic nodes, and the lower articular surface has been altered in a manner similar to that seen in tubercular disease with spontaneous cure.

Remark.—"When the thigh-bone is fractured by a person dropping from a height it is in general fractured obliquely, as in the present instance; and the extremities of the bones are thrust past each other, both in consequence of the direction of the force, and from the points penetrating easily into the flesh." (Sir Charles Bell's M.S. Catalogue.) B. C. 1. 1. M. 10.

3. 213. Comparatively Recent Oblique Fracture of the Shaft.—Section of the shaft of a femur, near the lower end—injected and in spirit.

"The young man was seized with erysipelas, which carried him off. This affords us an opportunity of observing the progress of re-union."

The interval between the broken ends of the bone is occupied by soft material, an early stage of fibrous tissue, which would have eventually developed into bone. B. C. 1. 1. M. 42.

3. 214. Comparatively Recent Oblique Fracture of the Shaft.—Section of the shaft of a femur—muscles dissected off—dried, injected, and in turpentine, to illustrate the above.

Time was not afforded for union by bone.

The specimen shows the vascularity of the material covering the broken surfaces, and from which the new bone would have been formed. B. C. I. 1. M. 44.

3. 215. Comparatively Recent Oblique Fracture of the Shaft.—Section of the lower end of a right femur—muscles cleaned off, and in spirit, showing the above.

The lower fragment over-rides *in front* of the upper, and the ends overlap for about four inches.

The interval between the broken ends of the bone is filled up by soft, fibrous-looking material, which would have eventually developed into bone. G. C. 2068.

Presented by P. NEWBIGGING, F.R.C.S.E., 1840.

3. 216. Comparatively Recent Comminuted Fracture of the Shaft.—Portion of the shaft of a femur—macerated, showing the above.

"The person lived some days after the accident, and at the time of his death was a patient in the Middlesex Hospital, from the house-surgeon of which, Mr Le Mann, I received the preparation. The fracture seems to have proceeded nearly half through the bone from before, without detaching but one large piece; more backward several splinters have broken off, many of which have united to a different part of the bone than that which they were detached from. One part in particular shows this, from the direction of the external fibres being very oblique in the splinter, and running directly from above downwards in the part of the bone from which it was broken off. A piece of bone from three to four inches in length on the back part of the femur, but not reaching the anterior surface of it, has been broken off, and, without change of position, has united in some places to the bone above, and had began to unite with the bone below. Splinters of bone are found adhering even to the detached portion. In some places there seems to have been no attempt at union.

This . . . demonstrates that splinters in fracture are sometimes broken off, and again adhere even to other surfaces than those from which they were broken, and that splinters do not necessarily lose their principle of life."

W. C. G. 4.

3. 217. United Fracture of the Shaft.—Lower portion of the shaft of a femur—macerated. A section is removed from the fractured portion, to more clearly illustrate the mode of union.

The section shows that the ends of the medullary cavity have been closed by a thin plate of bone, and that the interval between the broken ends is occupied by cancellous tissue, which has a thin, compact plate on the outside continuous with the adjacent surfaces of each fragment of the shaft. The upper fragment over-rides in front of the lower, and is set at an angle to it.

B. C. 1. 1. M. 32. c.

3. 218. Somewhat recent Compound Fracture of the Shaft.—Portion of the shaft of a femur—muscles removed, to illustrate the above—in spirit.

From a patient 65 years of age, in the Royal Infirmary, who received a compound fracture near the middle of the bone. Several of his ribs were also broken, and he suffered considerably from inflammation of his lungs. He was affected with jaundice, and erysipelas of the injured leg came on five days after the injury. Extensive abscesses took place, his pulse intermitted, his limbs became œdematous, diarrhœa came on, and he died six weeks after the injury.

The broken extremities of the bone seem to be dead, but have not had time to become loose. There has been no attempt at union.

G. C. 2225.

Presented by Alexander Watson, Esq., **1839.**

3. 219. Comparatively recent Compound Fracture of the Shaft.—Lower end of a left femur—macerated, showing the changes dependent upon the above.

3. 219. (*Contd.*)—The fracture has been nearly transverse. A part of the bone at the seat of fracture has necrosed, and has been in process of separation. Beyond the commencing groove of separation, irregular, newly-formed bone has been thrown out. The fracture has probably been compound and septic.

F. P. C. 125.

3. 220. United Compound Fracture of the Shaft.—Right femur of a young person—macerated, showing the above. All the epiphyses, except that for the small trochanter, have been lost during maceration.

The lower fragment is internal to the upper, and its lower end has been tilted forwards and outwards. There has been much inflammation, and the surfaces above and below the fracture are crusted with newly-formed periosteal bone. The fracture has therefore probably been compound.

F. P. C. 126.

3. 221. Badly united Fracture a little way below the Small Trochanter.—Upper end of a left femur—macerated, and divided vertically, showing the above.

The line of fracture has begun below the small trochanter, and has run obliquely downwards and outwards. The upper fragment is tilted outwards, and over-riding has occurred. The medullary cavity is interrupted by cancellous tissue. The union has been very solid. F. P. C. 105.

3. 222. United Fracture a little below the Lesser Trochanter.—Left femur—macerated, showing the above.

The upper end is tilted outwards and slightly forwards. The lower part of the shaft has lost its usual forward bend, and has received a slight bend backwards as well as one distinctly outwards. The outer condyle is thus relatively raised, and some knock-knee must have existed.

Although in some respects the shape of this bone resembles that found in rickets, its similarity to the specimens which pre-

cede and follow it renders more probable the theory of old-standing fracture.

The lower part of the shaft shows signs of a slight periostitis. B. C. 1. 1. M. 32. a.

3. 223. **United Fracture a little below the Lesser Trochanter.**—Left femur of an aged man—macerated, showing the above.

The upper fragment has been tilted outwards and slightly forwards, and the level of the head is below that of the great trochanter. There is much thickening round the fracture, extending downwards in the shaft. The broken ends have been hidden in front by the callus, but are still distinct behind. The lower end of the shaft preserves its normal forward bend, but, as in the former case, the inner condyle is prolonged downwards, and there has probably been knock-knee. The whole bone is lightened, probably, however, from advanced age. The articular surfaces show changes indicative of arthritis deformans.

B. C. 1. 1. M. 32. b.

3. 224. **Badly united Fracture a little below the Lesser Trochanter.**—Right femur of an adult—macerated, showing the above.

The upper fragment is tilted greatly outwards, and is displaced behind the lower one. The head of the bone is on a level with the great trochanter, and the whole shaft has had an outward bend at the seat of fracture, which is only partially compensated for by a slight bend inwards at the lower end. The inner condyle is prolonged downwards, and there has evidently been knock-knee. The bone, although not thickened, is unusually heavy. From the rounding off of the prominences at the seat of fracture, and from the evidently secondary changes in the lower end of the shaft, the fracture may be considered one of long standing. B. C. 1. 1. M. 28.

3. 225. Badly united Fracture a little below the Lesser Trochanter.—Plaster cast of the pelvis and thighs of the patient from whom the previous specimen was taken.

The cast shows the distortion of the injured thigh, consequent upon the irregular union of the fractured femur.

B. C. 1. 1. M. 32.

3. 226. Badly united Fracture through the Upper Third of the Shaft.—Inner section of the upper end of a right femur—macerated, showing the above. The head is wanting.

There has been a fracture about three inches below the lesser trochanter, and the upper fragment has over-ridden in front of the lower. The ends of the bones have been encased in an irregular mass of cancellous tissue, which has also interrupted the medullary cavity. The upper fragment is tilted forwards and slightly outwards. B. C. 1. 1. M. 33. i.

3. 227. United Fracture at the Junction of the Upper and Middle Thirds.—Left femur of a strong man—macerated, showing the above.

The upper fragment is tilted slightly forwards, but the union is otherwise good. There is not much callus at the seat of fracture, yet the whole bone is heavier than it should be. The difference between the weight of the bone in this and in No. 3. 223 may have been due to the difference in age of the individuals. This specimen has probably been taken from a middle-aged, the other from an old person. B. C. 1. 1. M. 27.

3. 228. United Fracture about the Middle of the Shaft.—Inner half of the central portion of the shaft of a left femur —macerated, showing the above.

The upper fragment has been tilted forwards, and a large

amount of dense new bone has been thrown out round the seat of fracture. On the surface of the callus there are numerous apertures for the entrance of blood-vessels.

B. C. 1. 1. M. 33. e.

3. 229. Badly united Fracture about the Middle of the Shaft.—Left femur—macerated, showing the above.

The upper fragment has been tilted forwards and inwards; the lower end is rotated slightly outwards. The broken ends over-ride, and are separated by a considerable interval which is filled up by dense new bone formation. The broken ends of the bone must at one time have exposed the medullary cavity, but this is now covered in by new bone.

Figured in Bell's "Observ. on Injuries of Spine and Thigh Bone," plate vi. fig. 3.

B. C. 1. 1. M. 26.

3. 230. Double Fracture of the Shaft united in Bad Position.—Shaft and upper end of the left femur of an adult—macerated, to show the above.

This was the thigh-bone of a madman, who threw himself out of the window, and kicked and struggled so that they could by no means secure the position of the limb. The thigh-bone in its natural state was 18 inches in length; it is now only 13 inches. It lost 5 inches in length, yet to that diminution had the muscles adapted themselves.

There has been over-riding at both fractures, and great distortion at the upper one. The medullary cavity has been partially covered in, and the uniting bone at both fractures is still cancellous.

Figured in Bell's "Observ. on Injuries of Spine and Thigh Bone," plate vi. fig. 6.

B. C. 1. 1. M. 23.

3. 231. United Fracture about the Middle of the Shaft.

3. 231. (*Contd.*)—Upper end of a right femur—macerated—with section through the seat of fracture, to show the above.

The upper fragment has been tilted forwards, and over-rides the lower one. A longitudinal splinter seems to have been broken from the inner side of the shaft. The medullary cavity has been closed in by bone, and the broken ends have been united by bone, which in some places is extremely dense.

W. C. G. 7.

3. 232. United Fracture about the Middle of the Shaft.—Left femur—macerated, showing the above.

The upper fragment over-laps behind the lower one, which is rotated outwards. The broken ends of the bone have been united by a dense callus, and the exposed medullary cavity has been closed in in each fragment. It should be noted that in fractures at this level the upper fragment is usually displaced in front of, not behind, the lower one. B. C. 1. 1. M. 30.

3. 233. United Fracture at the Middle.—Left femur—macerated, showing the above.

The upper fragment over-rides in front of the lower, and both are tilted outwards. There is considerable callus between the broken ends. The closing of the medullary cavity of the broken ends, and the smoothing over of the strong intervening callus, are similar to that seen in previous specimens.

B. C. 1. 1. M. 33. c.

3. 234. United Fracture about the Middle of the Shaft.—Right femur—macerated, showing the above.

The upper fragment is tilted forwards and over-rides in front of the lower. The medullary cavity is closed in, and the callus between the fractured ends is just sufficient to unite them.

It may be observed in this, as in many of the previous specimens, that no callous formation has at least been permanent, except between the broken surfaces of the bone, where it is of service in uniting them. G. C. 363.

3. 235. United Fracture about the Middle of the Shaft.—Posterior section of lower end of a left femur—macerated, showing the above.

The upper fragment has lain in front of the lower, and the broken ends have been drawn inwards. The union has evidently been of long standing. B. C. 1. 1. M. 33. f.

3. 236. Badly united Fracture about the Middle of the Shaft.—Right femur—macerated, showing the above.

The upper fragment is in front of the lower. They both over-ride to a considerable extent, and at their junction form an obtuse angle, pointing inwards. The lower fragment is rotated outwards through an angle of about 45°. The medullary cavity is closed in, and the ends are united by an irregular mass of bone.

F. P. C. 123.

Presented by Professor JOHN THOMSON.

3. 237. Badly united Fracture about the Middle of the Shaft.—Fragment of the shaft of a femur—macerated, showing the above.

The specimen was found in the bush, among other bones, at Sangaga, Vintang Creek, south bank of the Gambia, W. Africa, on 13th January 1891.

There was evidence of a fight having occurred at the spot some time before.

The upper fragment is anterior and internal to the lower, and a firm mass of bone unites them. G. C. 3457.

Presented by J. LESTER, M.B., C.M.

3. 238. Badly united Fracture about the Middle of the Shaft.—Right femur—macerated, showing the above.

The upper fragment, sharply pointed, over-rides in front of the lower, and at a distance from it of about 1½ inches, and yet the interval is partly filled up by dense callus. The lower fragment is tilted outwards below, and is rotated slightly outwards.

Figured in Bell's "Observations on Injuries of Spine and Thigh Bone," pl. vi. fig. 2.

B. C. 1. 1. M. 25.

3. 239. Badly united Fracture, a little below the Middle of the Shaft.—Right femur—macerated, showing the above.

The upper fragment over-rides in front of the lower, and at a distance from it of about 1½ inches, and yet the interval is completely filled up by dense callus. The medullary cavity of each fragment has been closed over, and, as in many of the previous specimens, the callus has a smooth outer shell, continuous with the adjacent portions of the shaft. The fragments are in line, and the lower one is rotated slightly outwards.

B. C. 1. 1. M. 33. k.

3. 240. Badly united Fracture at the Junction of the Middle and Lower Thirds of the Shaft.—Left femur—macerated, showing the above.

The bones are united in a manner similar to that seen in the foregoing specimen, but with less interval between the fractured ends. The upper fragment is in front of the lower. Above the seat of fracture it is curved outwards and forwards, and its diameter, increased in the direction of the curve, is flattened from side to side. The lower fragment is rotated outwards, but is very little changed in appearance.

B. C. 1. 1. M. 33. d.

3. 241. Badly united Fracture in the Lower Third of the Shaft.—Right femur—macerated, showing the above.

The upper fragment is in front and to the inner side of the lower, which is rotated very slightly outwards. The broken ends overlap considerably, and there is a large mass of callus between them. B. C. I. 1. M. 29.

3. 242. Ununited Fracture of the Shaft.—Portions of the shaft of a femur—with the muscles dissected off and in spirit, to show the above.

"The bone was twice broken. After the first accident, matters seeming to go on prosperously, he had risen from bed, and was walking upon crutches, when his crutch slipped from under him, and he broke the bone a second time. It seemed now to be very ill set, for the preparation shows the bone riding, accordingly union by bone did not take place. A joint formed instead, and in this condition he was brought into the Middlesex Hospital. I made various attempts, by exciting the extremities of the bone, to produce what has been termed ossific inflammation, but without succeeding. At last, at the earnest request of the patient, the limb was amputated."

The bones have been in bad position, greatly overlapping, and are now united by apparently fully-formed fibrous tissue. The medullary cavity of each fragment has been closed in by bone, and a spur of bone has grown from the side of the upper fragment. Between this and the lower fragment a false joint (adventitious bursa) has formed. This has been laid open, and a fibrous band crossing it is indicated by a bristle. The closure of the medullary cavity would indicate that the non-union in this case was at least not due to deficient power to form bone. B. C. I. 1. M. 11.

3. 243. Fracture of the Shaft, followed by Sarcoma.—Section of a femur, soft parts dissected off—in spirit, showing the above.

The patient, a man aged 45, fell and broke his femur. After it had united, he fell and broke the bone a second time. It was treated as before,

and at the end of the usual time had united. Shortly afterwards a tumour arose in the centre of the thigh, and increased rapidly, with much pain. The thigh was amputated at the level of the small trochanter, but the patient died. (See case of Phineas, Bell's "Surgical Observations," p. 376.)

The specimen shows that the union between the broken ends has been complete, although the bones have overlapped. The masses of greyish tumour substance are seen invading the texture of the bone on both its inner and outer aspects.

B. C. 1. 1. M. 33. a.

FRACTURES INVOLVING THE KNEE-JOINT.

3. 244. Double Fracture of the Condyles.—Lower ends of the right and left femur of a young man—macerated, showing the above.

The patient threw himself over a window four storeys high, in consequence of a melancholy state of mind There was concussion, with effusion of blood on the brain, and abscess of the liver, which had burst into the thorax through the diaphragm. He lived only two hours after the fall.

On the left side the outer condyle has been split into two pieces. On the right side the condyles and the bone in their immediate neighbourhood have been severely comminuted.

G. C. 1738.

Presented by Professor J. W. Turner and A. Watson, Esq.

3. 245. Splitting of the Condyles, with Fracture of the Shaft.—Portions of the lower end of a left femur—macerated, showing the above.

The patient, a young French sailor, fell on the deck from the mast-head of a ship in Leith Roads, and sustained, besides this comminuted and compound fracture of the left femur, a simple fracture of the right femur, as well as a fracture of the lower jaw, and one of the base of the skull. He lived for twenty-four hours after the injury.

The vertical split has separated the condyles as nearly as possible in the mesial plane. The transverse break has been

irregular, and has left more of the bone above the outer than above the inner condyle. G. C. 2475.

Presented by W. A. FINLAY, F.R.C.S.E., 1876.

3. 246. Compound Comminuted Fracture of the Lower Ends of the Condyles.—Lower end of the right femur of an old woman—macerated, showing the above.

The knee was crushed between a cart-wheel and a wall. The patient was about 60 years of age, and lived six weeks after the accident, when she died from diseased aorta producing hydro-thorax.

The condylar portion of the bone has been broken off from the shaft, and an oblique fissure has separated the inner and a small piece of the outer condyle from the rest of the condylar fragment.

There has been an extensive formation of new periosteal bone upon the lower end of the shaft, but only a slight amount upon the lower fragments. The appearance of this new periosteal bone indicates septic irritation. It is probable, therefore, that the fracture has been compound.

F. P. C. 137.

Presented by Professor J. W. TURNER and A. WATSON, Esq.

3. 247. Fracture through the Condyles, followed by Sarcoma.—Inner half of the bones forming the right knee-joint —muscles dissected off, in spirit, showing the above.

The fracture has been oblique from behind downwards and forwards. The lower end of the upper fragment has protruded into the front of the knee-joint. Between the fragments soft material is seen which in some places is fibrous, and in others is "fungus hæmatodes" (sarcoma).

B. C. 1. 1. M. 33. b.

3. 248. Separation of the Lower Epiphysis of the Femur.

—Right femur of a boy aged 13—macerated, showing the above. The lower epiphysis is quite separate from the shaft.

The patient fell from the joisting of a house on the floor below, and his right leg went through the flooring. When brought into the Hospital, the house surgeon reported to Mr J. a case of common fracture of the thigh-bone. He lay with the usual securities upon the limb for about a fortnight before I was called to consult upon it. The boy was hectic, much reduced, a dry tongue, irritable pulse, and upon the inside of the knee there were deep sloughy spots. Next day, in consequence of the restlessness of the boy during the night, I found the bone sticking through the integuments, and saw from the appearance of the bone that the case had been mistaken, and that, instead of a fracture communicating with the joint, it was a diastasis, or separation of the epiphysis. Even now I thought it not too late to amputate, with some chance of the boy's surviving, but it was thought he had somewhat rallied from the day preceding, and that he might be still better on the morrow. On that day he died. The dissection exhibited great suppuration within the knee-joint, an immense abscess or cavity communicating with the knee-joint, and extending up the bone nearly to the hip. The periosteum could be torn with the fingers from half the length of the bone. Such, then, are the consequence of a diastasis of the lower head of the femur, and by this we see that the case classes itself with the worst kinds of fractures communicating with the knee-joint.

Apparently a small portion has been broken off the lower end of the shaft. The surface of the shaft at the lower end has at some places a considerable crust of new periosteal bone, while at others the vascular pores are opened out. A similar opening out is seen all the way up the shaft. At the front of the neck a patch of the surface is eroded. These changes have evidently been due to septic osteo-myelitis, an accidental consequent of the injury. B. C. 1. 1. M. 8. a.

3. 249. Separation of the Epiphysis, with Mal-union.—Lower end of a left femur—macerated, showing the above.

A lad, in attempting to get upon the back of a gentleman's carriage, got his legs entangled within the spokes of the wheel, and the lower extremity of the femur was broken off, suffering that sort of accident which was called diastasis. Union took place after this accident, but the broken portions united irregularly, and a point projected. Years after this accident, and when the patient had grown into manhood, he suffered an accident of a still more serious nature. In carrying a burden

on his head, his foot slipped, and in the attempt to recover himself the actions of the muscles of the thigh pressed the popliteal artery against the projecting point of bone, and the artery was ruptured, and an aneurism was formed. It was found necessary finally to amputate the limb. (For the remainder of the case, see the series illustrating arterial disease.)

The epiphysis has been united to the lower end of the shaft, with its back part projecting downwards, and its inferior parts looking forwards. The lower end of the shaft projects behind the epiphysis, and is rough and irregular. Although the epiphysis and the shaft are in bad position, the union between them has been exceedingly solid. (Figured in Bell's "Observations on Injuries of the Spine and Thigh-Bone," plate iv. fig. 3.) B. C. 1. 1. M. 9.

FRACTURES OF THE PATELLA.

3. 250. United Transverse Fracture of the Patella.—Patella—macerated, showing the above.

There has been a longitudinal break on the inner side, and another extending transversely from the middle of the first. No new bone has been formed on the joint surface, and only a little on the outer surface. This fracture has probably been caused by direct violence. (See Bell's "Observations on Injuries of the Spine and Thigh Bone," p. 57, also plate iv. fig. 1.) B. C. 1. 1. M. 61.

3. 251. United Irregular Fracture of the Patella.—Patella—macerated, showing the above.

There is a deep longitudinal fissure on the articular surface, and considerable irregularity on the anterior surface. This has probably been a fracture by direct violence.

B. C. 1. 1. M. 62.

3. 252. Ununited Transverse Fracture of the Patella.—Patella—muscles cleaned off and in spirit, showing the above.

The ends are united by firm fibrous tissue, and are about a quarter of an inch apart. B. C. 1. 1. M. 59.

3. 253. Ununited Transverse Fracture of the Patella.—Patella—muscles cleaned off and in turpentine, showing the above.

The ends of the bone, which are about half an inch apart, are united by fibrous tissue. B. C. 1. 1. M. 58.

3. 254. Ununited Transverse Fracture of the Patella.—Patella—muscles cleaned off and in turpentine, showing the above.

The ends of the bone, which are about one and a half inches apart, are connected by fibrous tissue.

B. C. 1. 1. M. 57.

3. 255. Ununited Transverse Fracture of the Patella.—Patella—muscles dissected off, in turpentine, showing the above.

The ends of the bone are about one and a half inches apart; on one side a piece of bone is embedded in the fibrous tissue uniting the bone. B. C. 1. 1. M. 56.

3. 256. Ununited Transverse Fracture of the Patella.—Patella—muscles dissected off and in turpentine, showing the above.

The ends of the bone are about five inches apart, and thus very long fibrous union has taken place. In the fibrous tissue small calcareous particles are seen.

W. C. G. 10.

3. 257. Ununited Fracture of the Patella—Fibrous Union torn across.—Knee-joint—in spirit, showing the above.

"The patella had been fractured, and ligamentous substance had formed betwixt the fractured portions, as in several specimens, and the muscles, adapting themselves to the lengthened tendons. The man could walk, but, walking under a heavy burden, he fell, and his leg bent under him, so that the new ligament was torn up, and the integuments which had united with it, and by consolidating had lost their elasticity, were torn also, so that, as is seen here, the interior of the joint was disclosed. The inflammation did not rise in the manner or to the extent I have seen take place from the puncture of the capsular ligament. Was this owing to there being disease previously?"

From the thinning and irregularity of the margins of the skin wound, there seems to have been considerable suppuration after the accident. B. C. I. 1. M. 63.

3. 258. Ununited Fracture of the Patella.—Plaster cast of a right knee-joint, showing the above.

The ends of the bone were about two inches apart.

F. P. C. 2940.

3. 259. Fracture of the Patella.—Plaster cast of left knee-joint.

The patient had evidently suffered from fracture of the patella, with a very wide separation of the fragments.

G. C. 3314.

FRACTURES OF THE TIBIA AND PROCESS OF UNION.

3. 260. Normal Tibia.—Section of a normal tibia—macerated.

The specimen is mounted for comparison with the following fractured tibiæ. G. C. 3560.

3. 261. Recent Fracture of the Tibia, involving the Knee-joint.—Upper end of a right tibia and lower end of

the femur—injected and in spirit. The soft parts are cleaned off.

There is an oblique fracture extending from before backwards through the upper part of the shaft of the tibia, and a split has extended upwards through the outer tuberosity into the articular surface. The knee-joint shows signs of an early stage of arthritis deformans. F. P. C. 2966.

3. 262. Comminuted and Impacted Fracture of the Tibia, involving the Knee-joint — comparatively recent.—Upper end of a right tibia and fibula—macerated, showing the above, which resembles the previous specimen.

The patient died of erysipelas six weeks after the accident.

The outer tuberosity has apparently been forced downwards, and has been partly detached from the rest of the bone. The shaft has given way obliquely from without downwards and inwards at the level of the tubercle. The lower fragment has evidently been forced upwards, for several pieces of bone are embedded in the upper fragment behind, while on the outer side of both fragments small pieces of bone have been everted. These injuries seem as if they might have been produced either by a fall on to the foot with the leg extended and the main pressure directed upon the outer side of the knee-joint, or by a severe wrench tending to bend the knee-joint inwards, *i.e.* as if to produce knock-knee. G. C. 175.

Presented by Professor JOHN TURNER.

3. 263. Recent Comminuted Fracture of the Tibia and Fibula.—Lower portions of a left tibia and fibula—macerated, showing the above, with the fragments wired together.

"The injury was compound. The knee-joint was in this case preserved to the patient, although the fracture involved nearly the whole of the tibia; indeed, the fibula was entirely removed."

The bones have been severely comminuted.

G. C. 1129.

Presented by JAMES PITCAIRN, F.R.C.S.E.

3. 264. Comminuted Fracture of the Tibia and Fracture of the Fibula.—Lower two-thirds of a left tibia and fibula—macerated, showing the above, with the fragments wired together.

The fracture was compound.

The tibia is fissured and splintered irregularly, and the fibula broken, leaving a sharp lower fragment.

G. C. 175. a.

3. 265. Fracture of the Tibia.—Upper end of a left tibia—macerated, showing the above.

The fracture was a compound one, and the leg was amputated immediately after the accident.

The shaft has been irregularly fractured in its lower third. There is a sharp point on the inner side which might have tended to pierce the skin. G. C. 1226.

Presented by JOHN CAMPBELL, F.R.C.S.E.

3. 266. Fracture of the Tibia. — Portions of a tibia — macerated, showing the above.

The leg had to be amputated three weeks after the accident. The patient died.

G. C. 1146.

Presented by Professor JAMES RUSSELL.

3. 267. Somewhat recent Comminuted Fracture of the Shaft of the Tibia and Fracture of the Fibula.—Lower ends of a right tibia and fibula—injected, muscles cleaned off, and in spirit, to show the above.

The injury was at first simple, but the leg became gangrenous, and, at the end of the third week, was amputated.

The periosteum is thickened, and the broken surfaces are

for the most part covered with lymph. At some places the compact tissue at the seat of fracture is smooth and bare.

G. C. 312.

Presented by Dr MACLAGAN and J. W. TURNER, F.R.C.S.E.

3. 268. Uniting badly-set Fracture of the Tibia and Fibula.—Portions of the shafts of the tibia and fibula, with the muscles dissected off—in spirit, showing the above.

The upper fragment of the tibia is uniting to the lower fragment of the fibula, and the other fragments of each bone are free. The medullary cavities, where exposed, have been covered in, apparently as yet by soft material. The opposed fragments of the tibia and fibula have, however, been united by spongy bone, a slight crust of which is also seen on the adjacent tibia. G. C. 1053.

Presented by Professor JAMES RUSSELL.

3. 269. United Fracture of the Tibia and Fibula.—Lower half of a right tibia and fibula. The limb was injected, the bone cleaned, and put into weak acid, then dried and placed in turpentine.

The fibula, near the lower end, has an indistinct fissure, and shows considerable enlargement and bony growth on the surface, as if this part had lain beneath an ulcer. The tibia has been irregularly broken about four inches above the ankle-joint, and the uniting medium is more vascular than the surrounding bone. The internal malleolus appears to have been broken off, and to have re-united. B. C. 1. 1 M. 43.

3. 270. United Oblique Fracture of the Shaft of the Tibia.—Section of the lower half of a right tibia—macerated, showing the above.

The fracture has been oblique, but the broken ends have been in fairly good position. There is very little external callus, and the medullary cavity has been restored.

B. C. 1. 1. M. 46. i.

3. 271. **United Oblique Fracture of the Shaft of the Tibia.**—Sections of the lower end of a left tibia—macerated, showing the above.

The line of fracture has run obliquely from the inside and above downwards and outwards. The ends over-ride, and are set at an angle which projects forwards. The broken ends are united by firm callus where they are in contact. The medullary cavity, where exposed, has been closed in, but in the interior the continuity of the canal has not been re-established.

B. C. 1. 1. M. 46. h.

3. 272. **Badly united Fracture of the Tibia.**—Plaster cast of a right leg and foot, showing the above.

The patient had sustained a compound fracture by the fall of a heavy box on his leg. As the result of imperfect setting this displacement resulted, and he was admitted to the Royal Infirmary, 13th April 1869, under Dr J. D. Gillespie, to have it put right. "A triangular piece of the tibia was cut away at the spot. No trace was to be found of the fibula, which must have been broken and mended merely by fibrous tissue."

The mal-position of the fracture must have rendered the leg quite useless for walking.

G. C. 2675.

Presented by J. D. Gillespie, F.R.C.S.E.

2. 273. **Badly united Fracture of the Tibia.**—Plaster cast of the same limb as the last, after operation.

This cast was taken in June 1869. The patient could then use his leg perfectly.

G. C. 2676.

Presented by J. D. Gillespie, F.R.C.S.E.

3. 274. Recent Compound Fracture of the Tibia.—Section of a left tibia and adjacent soft parts—injected, and in spirit—to show the above.

The patient was a rather "done" man of 56. He was knocked over by an engine, and sustained a compound fracture of both bones of the left leg. An effort was made by antiseptic means to save the limb, but suppuration set in, and amputation became necessary. The stump was affected by a persistently spreading cellulitis, which resisted all treatment and eventually carried him off.

The broken ends of the bone are smooth and bare, and would probably have necrosed in time. There was considerable congestion of the medulla at and near the seat of fracture.

G. C. 3200.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 275. Ununited Compound Fracture of the Tibia and Fibula.—Lower two-thirds of the shafts of a left tibia and fibula (blackened by putrefaction)—macerated, showing the above.

The tibia has been broken about the middle, and the fibula lower down. The fracture has evidently been compound, and must have been followed by extensive suppuration, continuing for weeks and months. There has been great periostitic enlargement of both bones.

The lower fragment of the tibia near the fracture is greatly eroded, and was probably necrotic, but no fragments are loose. The upper fragment of the tibia is enlarged, and its broken surface is hollowed out and very irregular. The upper fragment of the fibula is enlarged and condensed. A mass of new bone unites the lower end of the tibia to that of the fibula, but there has been no union between any of the other fragments.

F. P. C. 158.

3. 276. Compound Fracture of the Tibia.—Portion of a fractured tibia—macerated, showing the above.

This fracture has probably been compound. Some of the bone at the fractured spot has necrosed, and has been in process of separation. The bone near has been stimulated, and shows a crust of new periosteal bone. F. P. C. 2955.

Presented by Professor JOHN THOMSON.

3. 277. Compound Fracture of the Tibia and Fibula.—Upper three-fourths of a left tibia and fibula, with a small portion of the outer malleolus—macerated, to show the above.

Newly formed cancellous bone fills the lower broken end of the tibia, and periosteal bone has been formed on both bones near the seat of fracture, while the rest of their surfaces shows opening out of the pores for blood-vessels. W. C. G. 12.

UNITED FRACTURES OF THE TIBIA AND FIBULA.

A. *Of both bones at the same spot*, i.e. *by direct violence.*

3. 278. Badly united Fracture of the Tibia and Fibula, about the Middle.—Plaster cast of a right tibia and fibula, showing the above.

The bones are united at an angle directed forwards, and are thickened in their whole extent, but especially at the seat of fracture. G. C. 3331.

From a Specimen in the Barclay Collection by JAMES RICHARDSON.

3. 279. Badly united Fracture of both Bones—Portion of a right tibia and fibula—macerated, showing the above.

The fractured bones are united in a common mass. The lower fragment of the fibula is greatly thickened and runs into the upper end of the tibia. With the exception of the upper part of the fibula, the bones are greatly thickened and irregular on the surface, and a shelf of bone on the upper end of the

lower fragment of the tibia has all the appearance of having been due to an ulcer of the soft parts over it.

G. C. 3063. a.

Presented by Bryan C. Waller, F.R.C.S.E.

3. 280. Badly united Fracture of both Bones near their Lower End.—Lower two-thirds of a left tibia and fibula—macerated, showing the above.

The lower fragment of the tibia is united to the upper fragments of both tibia and fibula, while the fragments of the fibula are also united to one another.

B. C. 1. 1. M. 38.

3. 281. Badly united Fracture of both Bones.—Lower half of a left tibia and fibula—macerated, showing the above.

The patient was an old man, who died of malignant disease of the intestine. His leg had been injured by a reaping machine many years before his death, and he had walked without discomfort, though probably with a limp.

The fracture has been at the same level in both bones.

The fragments have over-ridden to a great extent. The lower fragment of the fibula is united to the upper fragment of the tibia as well as to its own upper fragment. There is considerable callus between the broken ends of the tibia.

G. C. 3325.

Presented by Charles W. Cathcart, F.R.C.S.E.

3. 282. Badly united Fracture of both Bones near their Lower Ends.—Left tibia and fibula—macerated, showing the above.

The lower ends are tilted forwards and slightly inwards from the seat of fracture, and thus form with the upper fragments an angle which projects backwards and slightly outwards. A bar

of bone unites the tibia and fibula at the seat of fracture. This form of mal-union is apt to occur if the heel be too much supported during treatment. W. C. G. 5.

3. 283. Badly united Fracture of both Bones near their Lower Ends.—Plaster cast of a right tibia and fibula, showing the above.

The fracture in the fibula was four inches from the lower end, while in the tibia the fracture began about the same level, and ran obliquely backwards and downwards. The lower fragments were tilted backwards and inwards. A large amount of callus had formed round the broken tibia. The cast is taken from one in the Barclay Collection by James Richardson.

G. C. 3332.

3. 284. United Fracture of both Bones near their Lower Ends.—Lower ends of a left tibia and fibula—macerated, showing the above.

The fracture has been oblique, and the break has occurred a little higher in the tibia than in the fibula. The union has been good, except that the tibia and fibula are united together close to the ankle. B. C. 1. 1. M. 41.

3. 285. Ununited Comminuted Fracture of both Bones near the Lower End.—Lower third of a tibia—macerated, showing the above. The lower fragment of the fibula corresponding to that of the tibia adheres to it, but the upper part of the fibula is wanting.

The upper fragment of the tibia has been split by the lower one, which has been driven into it. The broken surfaces are encrusted with newly formed bone round the fracture. The bones are eroded where they have been in contact, but have been mounted slightly separate to show the relationship. The fracture has probably been compound. G. C. 2780.

B. *Fractures of both bones at different places,* i.e. *by indirect violence.*

3. 286. United Fracture of the Tibia a little below the Middle, and of the Fibula a few inches higher.—Left tibia and shaft of fibula—macerated, showing the above.

The line of fracture in the tibia inclines downwards and inwards.

The bones are each united at an angle, which projects backwards, probably due to forward pressure of the heel during the treatment. B. C. 1. 1. M. 35.

3. 287. United Fracture of the Tibia low down, and of the Fibula near its Head.—Right tibia and fibula—macerated, showing the above.

The tibia has been broken at junction of its lower and middle thirds, and the fibula just below the head. The line of fracture in the tibia has been oblique from above and outside, downwards and inwards.

The lower fragments are rotated slightly outwards, and the foot must have gone with them.

The upper end of the tibia shows signs of arthritis deformans, and the semi-lunar cartilages have been ossified.

B. C. 1. 1. M. 46. e.

3. 288. United Fracture of the Tibia low down, and of the Fibula higher up.—Right tibia and fibula—macerated, showing the above.

The tibia has been broken at the junction of its lower and middle thirds, and the fibula at the junction of its two upper fourths. The fracture in each bone has been oblique from above and outside downwards and inwards, and the broken ends in each case overlap considerably. B. C. 1. 1. M. 37.

3. 289. United Fracture of the Tibia low down, and of

the Fibula higher up.—Right tibia and fibula—macerated, showing the above.

As in the previous specimen, the tibia has been broken at the junction of the lower and middle thirds, and the fibula at the junction of its two upper fourths. The broken ends of the tibia are set at an angle, which projects slightly forwards. The obliquity of the fracture of the tibia is the same as in the last specimen. In the fibula the direction of the break is difficult to trace, owing to irregularities at the seat of fracture. The overlapping of the fragments is less than in the previous specimen. B. C. 1. 1. M. 34.

3. 290. United Fracture of the Tibia near the Ankle-Joint, and of the Fibula about the Middle.—Right tibia and fibula—macerated, showing the above.

The line of fracture in the tibia is oblique from the outer and posterior part of the bone downwards, inwards, and forwards. In both bones the fragments overlap, and form an angle directed slightly forwards. The fibula at the seat of fracture has, moreover, been pressed towards the tibia. The grooves for tendons, at the lower end of both bones, are increased in depth, probably from chronic congestion. F. P. C. 178.

Presented by Professor JOHN THOMSON.

FRACTURES OF THE TIBIA.

(*Some of these have probably been indirect fractures of both bones, as the line of obliquity corresponds to that seen in such specimens.*)

3. 291. United Fracture of the Shaft about the Middle.—Lower two-thirds of a right tibia—macerated, showing the above.

The bone was divided longitudinally, but the condition of the interior is obscured by adipocere.

The bone has evidently been comminuted, and the lower fragment is rotated inwards. B. C. 1. 1. M. 46. d.

3. 292. United Fracture of the Shaft below the Middle.—Lower two-thirds of a right tibia—macerated, showing the above.

The line of fracture has apparently been from above and outside, downwards and inwards. The bones are set at an angle, which projects slightly backwards. This may have been caused by raising the heel during the process of union.

B. C. I. 1. M. 46. g.

3. 293. Badly united Fracture of the Tibia near its Lower End.—Right tibia—macerated, showing the above.

The line of fracture has been oblique from above and outside, downwards and inwards. The upper fragment over-rides on the inside, and is curved inwards near the upper end. The lower fragment has been rotated outwards. The interosseous membrane has been partly ossified. G. C. 2275.

3. 294. United Fracture of the Shaft near its Lower End.—Plaster of Paris cast of a left tibia, showing the above.

The line of fracture has been oblique from above and outside, downwards and inwards. The upper fragment over-rides on the inner side of the lower one.

Copied by permission from a specimen in the collection of Joseph Bell, F.R.C.S.E.

G. C. 3091.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 295. United Fracture of the Shaft near its Lower End.—Plaster cast of a left tibia, showing the above.

The line of fracture runs downwards and inwards, and the upper fragment over-rides on the inner side of the lower one. The bones are joined at an angle which projects slightly back-

wards, and the lower fragment has been rotated outwards, and the foot must have been carried with it.

Copied by permission from the collection of Joseph Bell, F.R.C.S.E.

G. C. 3090.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 296. United Fracture of the Shaft near its Lower End.—Lower two-thirds of a left tibia—macerated, showing the above.

The line of fracture runs downwards and inwards. The ends overlap, but the union is otherwise good, except that there is an interval between the fragments at the back. Some marks of chronic periostitis are seen near the fracture.

B. C. I. 1. M. 46. f.

3. 297. United Fracture of the Shaft, which had an Ulcer over it.—Lower three-fourths of a right tibia—macerated, showing the above.

The fragments are set at an angle, which projects slightly forwards. At the seat of fracture, at the inner side, the surface of the bone is opened out and rough, as if there had been an ulcer over it. At other places the surface shows signs of periostitis.

B. C. I. 1. M. 40. a.

3. 298. Ununited Fracture of the Shaft, a little below the Nutrient Foramen.—Portions of a right tibia and fibula—macerated, showing the above.

The fragment of the tibia has a conical lower end, and is united externally to the fibula by a thick mass of new bone. The lower fragment of the tibia is wanting. Note that the fibula, below its union with the tibia, is thickened, as if taking on the function of the missing fragment of the latter.

B. C. I. 1. M. 46. a.

3. 299. Ununited Fracture of the Shaft, with Compensating Hypertrophy of the Fibula.—Plaster cast of the bones of a right leg, showing the above.

The original is in the Barclay Collection, and shows the smoothing of the broken ends of the tibia. The fragments are set at an angle backwards; the fibula, although much thickened, is bent in a similar direction. Another copy of the same specimen has been placed in the General Pathology Series, to illustrate Compensating Hypertrophy.

G. C. 3280.

FRACTURES OF THE FIBULA.

3. 300. Various Fractures of the Fibula.—Six fibulæ—macerated and mounted together—to illustrate the above.

In one there is a double fracture. The others exhibit more or less irregularity of union and overlapping of the fragments.

B. C. 1. 1. M. 46. j.

3. 301. Fracture of the Fibula.—Fragment of a fibula—macerated, showing the above.

The bone is irregularly united. B. C. 1. 1. M. 46. j.

3. 302. Fracture of the Fibula.—Portion of a right fibula—macerated, showing the above.

The bone is united at an angle, which projects forwards and inwards.

B. C. 1. 1. M. 46.

3. 303. Ununited Fracture of the Fibula.—Lower four-fifths of a right fibula—macerated, showing the above. The upper portion is wanting.

Some new bone has been thrown out at the seat of fracture,

and at other places the broken surface has been smoothed over. The vascular pores are enlarged over the greater part of the surface. The fracture has probably been compound.

B. C. 1. 1. M. 46. k.

FRACTURES INTO THE ANKLE-JOINT.

(*a.*) *Involving chiefly the Tibia.*

3. 304. Comminuted and Splitting Fracture of the Tibia, involving the Ankle-joint.—Lower half of a right tibia—macerated, showing the above.

The fracture has begun about six inches above the joint, and has run down in an irregularly spiral manner into the lower end, the fissures meeting one another, so that portions of the bone have become detached.

There are marks of periosteal activity on the fragments Apparently, therefore, the fracture has been compound, and amputation has been performed a few weeks after the injury.

G. C. 175. b.

3. 305. Fracture of the Tibia, involving the Ankle-joint —comparatively recent.—Inner half of a section of the lower end of a left tibia, astragalus, and os calcis—muscles dissected off—in spirit, showing the above.

The line of fracture has passed from above and behind downwards and forwards, and seems to have just reached the ankle-joint. The lower fragment of the tibia is displaced backwards. The broken surfaces of the cancellous tissue and adjacent periosteum seem to be infiltrated with recent lymph.

G. C. 3305.

3. 306. Comminuted Fracture of the Lower End of the Tibia, involving the Ankle-joint.—Lower ends of a

left tibia and fibula with the astragalus—macerated, showing the above.

The tibia has been severely comminuted and split, and several of the fragments are wanting. The fibula seems also to have been broken about five inches from its lower end.

G. C. 825.

Presented by Sir GEORGE BALLINGALL.

3. 307. Compound Comminuted Fracture of the Lower End of the Tibia, involving the Ankle-joint.—Astragalus and lower half of a right tibia and fibula—muscles cleaned off—in spirit, showing the above.

The lower end of the upper fragment of the tibia is bare, and some of the portions of the lower fragment have been removed, so that the articular surface is no longer recognisable. The fibula has been broken about four inches from the lower end, and the fragments overlap. The upper surface of the astragalus is almost completely denuded of cartilage. The soft parts which remain round the ankle appear infiltrated with lymph. Severe suppuration has evidently followed the injury. G. C. 1055.

Presented by Professor JAMES RUSSELL.

3. 308. Badly united Fracture of the Lower End of the Tibia into the Ankle-joint.—Right tibia, to which a small portion of the fibula adheres—macerated, showing the above.

The union is very irregular, and a piece of the fibula has become attached to the tibia at the seat of fracture. The rest of the fibula is wanting. The main fracture has apparently been from above downwards and forwards, but the lower fragment has been comminuted into the ankle-joint. There is a slight forward bend at the point of union. The upper articular surface is set obliquely to the shaft, as in genu varum, *i.e.* with the shaft of the tibia sloping downwards and inwards.

B. C. 1. 1. M. 39.

3. 309. United Fracture of the Tibia and Fibula into the Ankle-joint.—Anterior half of a section of the lower end of a right tibia and fibula—macerated, showing the above.

The fracture in the tibia has been oblique from above and inside downwards and outwards, while the fracture in the fibula has been from behind downwards and forwards. The lines of fracture in the two bones have met at the interosseous space, just above the ankle-joint. The fracture in each case is soundly united, and the two bones are welded together immediately above the ankle-joint. B. C. 1. 1. M. 46. b.

3. 310. Fracture of Tibia into the Ankle-joint, with Anchylosis.—Right tibia, with section through its lower end, passing also through an anchylosed astragalus and os calcis—macerated.

Evidently this has been a comminuted fracture of the lower end of the tibia, with some displacement forwards of the lower fragment. There is an osseous anchylosis between the tibia and the astragalus, and between the astragalus and the os calcis. G. C. 364.

(b.) Chiefly involving the Fibula.

3. 311. Recent Compound Fracture of the Fibula, Astragalus, and Os Calcis.—Lower ends of a right tibia and fibula, with the astragalus, scaphoid, cuboid, and part of the os calcis—macerated, showing the above.

The patient was a young man, whose foot had been badly crushed. An effort was made to save the limb, but the wound became septic, and amputation could not be avoided.

The fibula is comminuted and split into the ankle. The astragalus is also split, and the greater part of the os calcis was removed as loose fragments. G. C. 3376.

Presented by Charles W. Cathcart, F.R.C.S.E.

3. 312. Recent Severe Form of Pott's Fracture from a Crush.—Part of a right leg and foot, dissected to show the relation of parts in the above—in spirit.

The patient was a mason whose foot was severely crushed by a stone. Gangrene set in, and a few days after the accident amputation of the limb became necessary.

There is a comminuted fracture of the fibula just above the ankle. The inner malleolus has been broken off and comminuted. The peroneal tendons are displaced forward. Besides the above injuries, the posterior tibial artery was torn across, and the soft parts were greatly bruised.

G. C. 2849.

Presented by P. H. Maclaren, Esq.

3. 313. Recent Pott's Fracture from a Crush.—Lower ends of a right tibia and fibula, with the astragalus, scaphoid, and os calcis attached—muscles cleaned off, and in spirit, showing the above.

The fore part of the foot had been so severely crushed that amputation was necessary.

The specimen illustrates the injuries usually met with in Pott's fracture, the inner malleolus being broken off, and the fibula fractured a few inches above its lower end. The external lateral ligaments were divided by the surgeon, who amputated the leg, but the injury had left both lateral ligaments of the ankle intact. G. C. 2779.

Presented by Charles W. Cathcart, F.R.C.S.E.

3. 314. Fracture of the Fibula in Pott's Fracture.—Lower end of a right fibula—macerated, showing the above.

The patient, a man aged 44, slipped and twisted his foot under him. When admitted to the Royal Infirmary, Edinburgh, the lower part of the leg was very red, and was much swollen. The patient suffered from restlessness and want of sleep. In four days he became delirious. In spite of opiates and other treatment, he grew worse, and died comatose the ninth day after the accident. "The fractured surfaces were highly

vascular, covered with soft downy granulations, and evidently in the progress towards re-union."

The bone has given way irregularly, and has been somewhat comminuted. Some new periosteal bone is seen on the lower end of the upper fragment. G. C. 1098.

Presented by Sir GEORGE BALLINGALL.

3. 315. Severe Form of Pott's Fracture.—Right foot and greater part of the leg, with the skin removed, except round the inner malleolus, where the bone projected after sloughing. The muscles are dissected, and the specimen is mounted in spirit to illustrate the above.

A. B., aged 35, while intoxicated, slipped on the ice and fell, on 12th January 1837. He attempted to walk at first, but being unable to do so was afterwards driven home. Next day the fracture was reduced. In twenty-four hours afterwards great swelling came on, "the skin presenting a dark blush and numerous large dark-coloured phylctenæ." The splints were removed and leeches were applied. Eight hours afterwards the displacement was renewed by an involuntary muscular movement. The redness extended to the thigh, and over the inner malleolus a slough formed $3 \times 2\frac{1}{2}$ inches. On the 21st January an attack of delirium tremens came on and lasted for three days, during which the leg was much tossed about. Eventually the ankle-joint was opened into, and an abscess formed on the outer side. On the 1st of February the limb was amputated below the knee and the patient did well.

There is a fracture of the fibula about two inches above the malleolus, also rupture of the internal lateral ligament, and dislocation of the whole foot outwards. A piece of cane indicates how the ankle-joint was opened into. G. C. 1975.

Presented by Sir GEORGE BALLINGALL, 1837.

3. 316. Pott's Fracture, with Stiffness of the Ankle.—Lower half of a right tibia and fibula—macerated, showing the above.

"The joint upon dissection exhibited marks of former injury and disease, being stiff, and the ligaments deprived of their natural structure. The muscles on the back of the leg were reduced almost to common cellular texture."

The outer malleolus has been fractured obliquely, and the

lower fragment has been pushed up. There is much irregularity at the tip of the inner malleolus, round the articular margins of both bones, and at the grooves for tendons.

This must have been a severe case of Pott's fracture, followed by deformity and stiffness. B. C. I. 1. M. 46. c.

3. 317. United Fracture of the Fibula, from a Case of Pott's Fracture.—Left fibula of an old woman—macerated, to show the above.

The bone has been broken transversely about an inch and a half from its lower end. The whole bone is exceedingly light and fragile, and several from the same old woman have been macerated, to illustrate senile osteo-malacia (see series 6).

G. C. 3224.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 318. Unreduced Pott's Fracture.—Plaster cast of a left foot, showing the above.

The foot is displaced greatly outwards, and the heel is drawn backwards. The foot can have been of little or no use in walking. G. C. 3289.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

3. 319. Fracture of the Os Calcis.—Left os calcis—macerated, to show the above.

The patient was a man 60 years of age. A wheel passed over the foot; gangrene followed, and amputation was performed. The gangrene returned and the man died.

There is a depression of the compact layer on the outside, with some comminution, but no injury to the bone elsewhere.

G. C. 3250.

3. 320. Fracture of the Os Calcis.—Lower end of a left tibia and fibula, with the astragalus and remains of a broken os calcis —muscles dissected off and in spirit.

A young woman, 19 years of age, leaped from a window two floors from the street, and fractured the os calcis into six or eight fragments, one of which projects into the back part of the ankle-joint. Several weeks after the injury, in consequence of disease of the joint and abscesses about the foot, associated with necrosis, amputation of the leg was performed. The patient recovered.

The greater part of the os calcis seems to have been crushed up behind and to the outer side of the astragalus. Some new bone has been formed on the sides of the original os calcis, while at the back a cavity extends into its substance, near the orifice of which there is a piece of dead bone. G. C. 1981.

Presented by ALEXANDER WATSON, Esq., March 1839.

3. 321. Fracture of the Os Calcis.—The lower end of a right tibia, fibula, astragalus, and portion of the os calcis—cleaned, and in spirit.

The upper portion of the os calcis has been comminuted, and is separate from the lower. The broken surfaces are apparently covered by lymph. The articular cartilage upon the astragalus and outer malleolus is roughened and partially removed. This has probably been a case of compound fracture of the os calcis, followed by inflammation and suppuration.

G. C. 3504.

GUNSHOT FRACTURES OF THE LOWER LIMB.

(*a.*) *Chiefly from Waterloo.*

3. 322. Old-standing Gunshot Fracture of the Ilium.—Left ilium—macerated, to show the above. A portion of the bullet is wired in position.

"This man had been wounded by a small rifle ball. It had penetrated the ilium, and lay just within the bone, being prevented

from penetrating into the pelvis by the tough ligamentous attachments on the inside of the bone. He had come up to town to receive his pension, and in some of his irregularities in living the wound of the hip, which was not healed, became suddenly inflamed, with an attack of fever, and thus, several months after being wounded, he was cut off. The ball is attached, and seen to be a flattened piece of lead. The bone exhibits the consequences of inflammation, absorption, and granulation, since the hole made by the ball is enlarged by absorption, and the surface is rough with granulations of bone.

In the neighbourhood of the bullet there has been a perforation of the bone, and the walls of this perforation are necrotic and carious. Round about the perforation on both aspects new bone has been thrown out, and the vascular channels are enlarged all over. B. C. XVII. 12.

3. 323. Old-standing Bullet Wound of the Pubic Arch.—Front portion of a pelvis—muscles dissected off and in spirit, showing the effects of the above.

The patient lived a considerable time after the wound, and died of hydatids of the liver.

A mass of condensed connective tissue surrounds the track of the wound, which has been on the left margin of the pubic arch. B. C. XVII. 13.

3. 324. Head of a Femur carried off by a Bullet.—Head of a femur in which a bullet is embedded—macerated.

"This soldier received a musket ball in the hip. It was discovered that the thigh-bone was fractured, but he was dying of inflammation and pain of the abdomen. On dissection the head of the thigh-bone was found in the abdominal cavity, and on inspection it will be seen that the leaden ball was in the centre of the head of the thigh-bone. It is clear, therefore, that the force of the ball had been communicated to the head of the thigh-bone, where it had forced the acetabulum, and, by breaking through the pelvis, had got into the cavity of the abdomen." B. C. XVII. 15.

3. 325. Comminuted Gunshot Injury to the Head of the

Femur.—Small portion of the head of a femur—macerated, to show the above.

The patient was shot in the hip at Waterloo. He would not consent to any operation, and died.

B. C. XVII. 14.

3. 326. Bullet lodged in the Neck of the Femur.—Upper end of a right femur—macerated, showing the above.

The patient was a soldier who fought at Waterloo.

A fissure extends from the neck into the head on the front and back. The bullet is a round one, and lies in the front of the neck, in a cavity considerably larger than itself. The size of the cavity is probably due to suppuration round the bullet, as the bone texture that remains is carious, and at places necrotic, one piece on the lower side being in process of separation. The surface of the neck is opened out at places, and has a slight crust of new bone upon it.

Figured in Hennen's "Principles of Military Surgery," 1st edition, plate ii. fig. 4.

F. P. C. 213.

Presented by Professor JOHN THOMSON.

3. 327. Gunshot Fracture of the Great Trochanter.—Upper end of a right femur—macerated, showing the above. A round bullet is shown embedded in fragments of the great trochanter, which are wired in position.

This is another instance of the effectual barrier which ligament offers to the course of the ball. He was a prisoner endeavouring to escape from the prison-ship, and was shot while in the boat. He died of irritation.

The bullet has struck the back of the neck, and has travelled from within outwards, for, after ploughing a groove in the back of the neck, it has split and lodged in the great trochanter.

Figured in Bell's "Observations on Injuries of the Spine and Thigh Bone," pl. iv. fig. 5.

B. C. XVII. 16.

3. 328. Gunshot Fracture immediately below the Trochanter.—Upper end of a left femur—macerated, showing the above.

The patient was a soldier who fought at Waterloo.

The fracture is an irregular one. A fissure runs up into the neck on the inner side, and another into the great trochanter on the outer side. From the commencing necrosis at the seat of fracture on the outer side, and from marks of inflammation at other places, there has evidently been suppuration for days or weeks after the injury. F. P. C. 216.

Presented by Professor JOHN THOMSON.

3. 329. Gunshot Fracture in the Upper Third of the Shaft of the Femur.—Upper end of a left femur—macerated—showing the above.

The specimen is from a soldier who fought at Waterloo.

The fracture has been irregular, and a fissure runs up upon the outer side. A portion of bone on the inner side at the seat of fracture has necrosed, and has been in process of separation. The rest of the bone has evidently been inflamed.

F. P. C. 215.

Presented by Professor JOHN THOMSON.

3.330. Gunshot Fracture of the Middle of the Shaft of the Femur.—Lower two-thirds of a right femur—macerated, showing the above. The fragments are wired in position.

All the portions were driven among the muscles. The man lay on the field of Waterloo several days.

The bone has been severely comminuted for about four inches, but there are no fissures beyond the comminuted area. Roughness, due to periostitis, is visible over the whole of the shaft, and on the fragments as well. Smooth patches on the fragments and main part of shaft indicate necrosed pieces of bone which would have separated in time.

The man must have lived many days, if not several weeks, before amputation was performed. B. C. XVII. 42.

3. 331. Gunshot Fracture of the Lower Third of the Shaft of a Femur.—Lower two-thirds of a right femur—fragments wired in position—macerated, to illustrate the above.

The limb was amputated in the Gendarmerie after the battle of Waterloo.

The bone has been severely comminuted for about five inches, and fissures run down in the lower fragment towards the knee. On the shaft and on most of the fragments there are some marks of inflammation, but less advanced than those seen in the previous specimen. B. C. XVII. 43.

3. 332. Gunshot Fracture of the Lower Third of the Shaft of a Femur.—Lower portion of the right femur of a young adult—macerated, to show the above.

The patient was wounded at Waterloo.

A fragment of bone has been driven into the medullary cavity. The upper and inner portion of the fractured margin has necrosed, and has been in process of separation, while upon the shaft near it there is a crust of new periosteal bone. These show that inflammation and suppuration had been going on for many days after the injury (see 3. 342). F. P. C. 236.

Presented by Professor JOHN THOMSON.

3. 333. Gunshot Fracture of the Shaft of a Femur.—Portion of the shaft of a femur—macerated, to show the above.

The injury was received at the battle of Waterloo.

As in the previous specimens, portions of the broken edge have necrosed, and have been in process of separation. The rest of the bone has been inflamed and opened out, and some new periosteal bone has been deposited. F. P. C. 226.

Presented by Professor JOHN THOMSON.

3. 334. Gunshot Fracture of the Shaft of a Femur.—

Portion of the shaft of a femur—macerated, to show the above.

The wound was received at the battle of Waterloo.

The fracture has been oblique, but not comminuted. Near the seat of fracture there have been large deposits of new periosteal bone, but the margins of the fracture are smooth and apparently necrotic, which explains why there has been no attempt at union. In this, as in the previous cases, there has evidently been a septic compound fracture.

Figured in Hennen's "Military Surgery," 1st edition, plate ii. fig. 2.

F. P. C. 222.

Presented by Professor JOHN THOMSON.

3. 335. Pistol-shot Fracture of the Shaft of the Femur.—Lower part of the right femur of a woman—macerated, to show the above. The fragments are wired in position.

"Martha Holloway was shot with a horse pistol, said to be loaded with four slugs, and at the distance of two feet from her. The wound was on the fore and outer part of the thigh, and was of the size to let in the points of three fingers. When the finger was passed into the wound, a number of sharp splinters were felt. The lower part of the thigh-bone was greatly retracted behind the upper portion, and the limb was singularly misshapen. She refused to submit to amputation. The wound was enlarged and the fascia slit upwards and downwards. Two large portions of bone were extracted. The slugs could not be felt. Portions of slugs and dead pieces of bone were discharged at different periods. Large abscesses extended through the thigh, and there was no union of the bone eight months after the accident, when the limb was amputated."

The loose pieces of bone, wired to the bone near the seat of fracture, have, from the character of their surface, evidently been formed for the most part after the injury.

On the main pieces the new bone thrown out and the roughened condition of the surface indicate periosteal irritation, while the spongy appearance of the broken ends points to a septic form of caries, which must have prevented union.

B. C. XVII. 59.

3. 336. Gunshot Fracture of the Shaft of the Femur.—Portions of bone from the above case—macerated:

(*a*) A smooth piece removed immediately after the injury; (*b*) two necrosed pieces which were loosened and detached by the granulations; (*c*) a portion, consisting of new bone, with a small piece of the original bone on its under surface.

B. C. XVII. 59.

3. 337. Gunshot Fracture of the Shaft of the Femur.—Fragments removed from a case of the above—macerated.

The specimen was taken from a soldier wounded at Waterloo.

The main fragments are three in number, but to the middle one a smaller fragment—driven into the medullary cavity—is adherent by newly formed bone. Upon all the fragments there has been a deposit of bone. This is seen mostly upon the periosteal surface, but at other places also. Thus on the middle fragment a fine spongy projection on the medullary aspect can easily be distinguished as new bone from the neighbouring cancellous texture. Again, on the lowest fragment new bone has grown from the broken margin of a portion of the compact tissue. Portions of the broken margin on the two lower pieces are smooth, and have evidently been in process of separation.

See Hennen's "Principles of Military Surgery," p. 137, pl. i. fig. 3.

F. P. C. 227.

Presented by Professor JOHN THOMSON.

3. 338. Gunshot Fracture of the Femur.—Fragments removed from cases of the above—macerated. They illustrate characters noted in some of the foregoing specimens.

F. P. C. 228.

3. 339. Necrosis of the Stump of a Femur after Amputa-

tion for Gunshot Fracture.—Portion of the shaft of a femur—macerated, to show the above.

The wound was received at Waterloo.

The sawn surface and the bone near it are smooth, and have been dead. Beyond that the surface has been eroded by granulations, and further up it is encrusted with new periosteal bone. This is raised as an irregular collar, behind the groove of separation, and beyond that it fades gradually off into the general surface of the bone.

Figured in Hennen's "Military Surgery," 1st ed., plate iv. fig. 3.

F. P. C. 223.

Presented by Professor JOHN THOMSON.

3. 340. Necrosis of the Stump of a Femur after Amputation for Gunshot Fracture.—Small portion of the shaft of a femur—macerated, showing the above.

The wound was received on the field of Waterloo.

This specimen was formerly entered as a case of gunshot fracture, but as its features are essentially similar to these of the last, the title now adopted seems more suitable.

F. P. C. 221.

Presented by Professor JOHN THOMSON.

3. 341. Sequestrum after Amputation of the Femur for Gunshot Fracture.—Portion of the shaft of a femur—macerated, showing the above.

The patient was wounded at Waterloo.

As in the previous specimen, the sawn surface and neighbouring bone are unchanged from what they were at the time of operation. Beyond that, the bone has been pitted and eroded by the granulations during the process of separation.

Figured in Hennen's "Principles of Military Surgery," plate x. fig. 4.

F. P. C. 225.

Presented by Professor JOHN THOMSON.

3. 342. Gunshot Fracture of the Lower End of the

Femur.—Lower portion of the shaft of a femur—macerated, to illustrate the above.

The knee had been completely detached by grape-shot at Waterloo. "This poor wretch was not relieved by amputation for fifteen days after the battle."

The line of fracture is irregular, and two fissures run upwards for about three inches. At the seat of fracture, the bone is smooth. Round this there is a shallow groove of separation, while beyond that the surface is rough, partly from a slight crust of new periosteal bone, and partly from the opening up of vascular pores. It is important to note the extent to which these changes have been carried in a fortnight.

B. C. XVII. 41.

3. 343. Gunshot Fracture of the Lower End of a Femur.—Lower end of a left femur—macerated, to show the above. One or two fragments have been driven into the interior.

The patient was wounded at Waterloo.

The marks of periostitis indicate that the patient must have waited many days before amputation was performed. The irregular growth of bone round the articular surface has been due to arthritis deformans previous to the injury.

F. P. C. 237.

Presented by Professor JOHN THOMSON.

3. 344. Comminuted Gunshot Fracture of the Lower End of the Femur.—Lower two-thirds of a left femur—macerated—fragments wired together to illustrate the above.

"The knee, in this case, was completely driven off. It was fourteen days before anything was done for the patient. The portion marked off by the black line projected. Amputation, very high, was necessary, on account of the great bag of matter."

The articular end of the bone is in three pieces, and some fragments of the adjacent part of the shaft are missing. The upper fragment has indications of necrosis on the part which

protruded, and there has been periostitis above that, similar to what was noted in No. 3. 342. Some erosions are present upon the surface of the lower fragments. B. C. XVII. 33.

3. 345. Severe Gunshot Fracture of the Lower End of the Femur.—The lower end of the shaft of a right femur—macerated. Several pieces are missing, and the remaining fragments are wired together.

The wound was received at Waterloo.

The condylar portion of the bone has been split in several directions. The joint has been opened into, and, from the erosion of the articular surface, must have been the seat of suppuration. The lower end of the upper fragment shows changes similar to those noted in No. 3. 342 and others.

F. P. C. 239.

Presented by Professor JOHN THOMSON.

3. 346. Gunshot Injury of the Inner Condyle of the Femur.—Lower half of a right femur—macerated, to show the above.

This wound was received at Corunna. Suppuration of the limb followed the injury, and extended among the muscles of the calf. The patient was exhausted by hectic fever when amputation was performed.

In Sir Charles Bell's drawing of this specimen ("Operative Surgery," plate ii. fig. 1) the ball is seen lodged in the depression, in front of the inner condyle. The walls of the cavity have some necrotic fragments still adhering to them, but at other places the bony lining has been somewhat condensed. The outer shell of bone is splintered. B. C. XVII. 29.

3. 347. Gunshot Injury of the Back of the Outer Condyle of the Femur.—Lower end of a left femur—macerated, to illustrate the above.

A musket ball had lodged in the back of the outer condyle at the battle of Waterloo.

The back of the inner condyle is wanting, and a circular depression above it indicates where the bullet lay. Portions of the bone which formed the bed of the bullet have necrosed, and have been in process of separation. The joint had evidently been acutely inflamed, and the articular surfaces have been eroded. There is a small crust of new periosteal bone above and behind the condyles. F. P. C. 240.

Presented by Professor JOHN THOMSON.

3. 348. Bullet lodged in the Condyles of the Femur.—Lower end of a femur—with the patella and adjacent parts of tibia and fibula dissected, and a section removed from the outer condyle to illustrate the above—in spirit.

A Russian General, Baron Driesen, was struck by a musket-ball on the inner condyle of the left femur at the battle of Borodino on the 6th of September 1812. The ball lodged near the outer condyle. Inflammation and suppuration followed, causing great pain. Various attempts were made to remove the ball by dilating the wound with sponge tents but without success. During 1815 and until March 1816 the wound remained closed. At this time the parts became greatly swollen and very painful, the old wound reopened, and an abscess on the outer side was evacuated. Some improvement followed, and a German surgeon poured large quantities of mercury into the sinus in the hope of dissolving the bullet. This was followed by intense pain and numerous abscesses round the knee-joint. As these symptoms continued, the limb was amputated above the knee by Sir Charles Bell on the 7th of January 1817. For a time considerable pain and swelling remained in the stump, but these gradually subsided, and the Baron left London for St Petersburg in May of the same year.

Sir Charles Bell found mercury lodged in different abscesses round the joint and inflammatory thickening round the popliteal nerves. The patella, femur, and tibia were anchylosed by bone.

An encrustation round the bullet has obscured its metallic character, but indicates its position. (See Bell's "Surgical Observations," p. 431.) B. C. XVII. 38.

3. 349. Bullet lodged in the Condyles of the Femur.—Section removed from the foregoing specimen—macerated.

This piece shows the bony anchylosis between the patella and the femur, and a depression in the bone which formed the bed of the bullet. B. C. XVII. 38. a.

3. 350. Bullet lodged in the Condyles of the Femur.—Popliteal nerves, with adjacent muscle and lymphatic gland, from the same case as the foregoing.

Minute globules of mercury can be recognised on the section of the lymphatic gland and in the surrounding tissue. There is great matting of fibrous tissue round the nerves.

B. C. XVII. 39.

3. 351. Bayonet Wound of the Lower End of a Femur.—Lower end of a right femur—macerated, showing the above.

The bayonet wound was received at Waterloo. The leg was shattered, and required amputation above the knee.

"Although, in this case, the question of amputation was decided by the shattered condition of the bones of the leg, the wound in the head of the femur (*sic*) is interesting to us, as being that which, although apparently slight, is attended with the most serious consequences. The wound is on that part of the bone, which implies that the point of the bayonet has penetrated the capsule of the joint. It was, in short, a punctured wound, which, if inflammation be not prevented, may be followed, as in the present instance, by suppuration within the joint" (Sir Charles Bell). [Instead of "inflammation," we would now say "sepsis."—C. W. C.]

There is an indentation by the bayonet on the side of the inner condyle. B. C. XVII. 37.

3. 352. Bullet Wound of the Head of the Tibia.—Upper half of a right tibia—macerated, showing the above. The round bullet which lodged at the back has been wired in position.

The wound was received at Corunna.

"There was here, of course, a breach of the capsule of the joint. The consequences were great swelling of the whole extremity, matter in a cavity of the knee-joint, and a diffused abscess under the gastro-cnemii. The limb was properly amputated. This was from Corunna. It led me to expect what I saw afterwards at Waterloo" (Sir Charles Bell).

It should be noted that the wound of entrance is smaller than the bullet, also that the wound of exit is the larger and more irregular of the two. Some splinters of bone have been loosened at the wound of exit, and a fissure extends downwards for about four inches.

See Sir C. Bell's "Operative Surgery," pl. ii. fig. 2, and pl. xi.

B. C. XVII. 28. a.

3. 353. Bullet Wound of the Head of the Tibia.—Photograph, from a drawing by Sir Charles Bell, of the limb, before operation, from which the previous specimen was taken.

G. C. 3561.

3. 354. Gunshot Fracture of the Head of the Tibia.—Upper end of a right tibia—macerated, showing the effects of the above. The inner tuberosity, which had been shot off, is wired in position.

The specimen was taken from a soldier who fought at Waterloo.

The ball has apparently penetrated from within outwards, and has also split off the inner tuberosity. The bone in the track of the bullet has been necrotic, and evidently inflammation and suppuration have attacked the knee-joint. The articular surface is rough and opened out, and the surface of the bone generally is in a similar condition. F. P. C. 244.

Presented by Professor JOHN THOMSON.

3. 355. Gunshot Fracture of the Tuberosities of the Tibia.—Upper half of a left tibia and fibula of a young adult

—macerated, to show the above. The epiphyseal line is still visible.

"The ball passed through the head of the tibia, and must have broken upon the continuity of the capsular membrane; but this man got so well as to have been brought up to York Hospital for the purpose of being examined for a pension, when irritation and inflammation commenced, which made it necessary to amputate" (Sir Charles Bell).

The bullet has perforated, without splitting, the front of the head. New bone has been formed round the openings, especially on the outer side, and also on the front of the tibia for about three inches below the injured spot. There is a slight deposit on the head of the fibula. B. C. XVII. 30.

3. 356. Bullet lodged in the Upper End of the Tibia, followed by acute Osteo-myelitis and Necrosis of the Shaft.—Upper two-thirds of the right tibia of a young adult (epiphyseal line still visible)—macerated, to show the above.

The wound was received at the battle of Waterloo. Abscess and caries made amputation necessary.

The bullet, which is a round one, is lodged intact in a large cavity in the cancellous tissue at the back of the upper end of the bone. On the front of the shaft a large part of the compact tissue has necrosed. This dead piece has been partially separated above, while below its surface has been partly absorbed by granulations, and is in consequence very rough. A piece cut out of it shows that the separation was also proceeding from below. The rest of the shaft, especially at the back, is encrusted with new periosteal bone. Apparently, therefore, an acute osteo-myelitis following the injury produced by the bullet has ended in necrosis. B. C. XVII. 32.

3. 357. Bullet lodged in the Upper End of the Tibia, followed by Osteo-myelitis and Necrosis of the

Cancellous Tissue.—Upper end of the left tibia of a young adult—macerated, to show the above. A bullet is wired in a cavity in the head.

The injury was sustained at Waterloo. The extensive suppuration made amputation necessary.

The space round the ball contains a large fragment of cancellous bone, and some new periosteal bone has formed down the front of the shaft, but for a short distance only.

B. C. XVII. 31.

3. 358. Bullet lodged in the Knee, followed by Tuberculosis. Upper end of a right tibia—macerated, showing the above. A bullet is wired in position on the top of the outer tuberosity.

The articular surface is very irregular, being occupied by excavations. The walls of these are opened out, although one at the back shows signs of healing. On the outer condyle an island of necrotic bone remains, with its articular surface unchanged, and surrounded by a deep trench. At one or two other places similar though smaller islands are seen. These appearances are identical with those seen in advanced tubercular disease.

The surface of the bone below the articulation is much roughened by newly formed periosteal bone. This indicates that sepsis has accompanied the tubercular process.

F. P. C. 245.

3. 359. Gunshot Fracture of the Tibia and Fibula.—Right tibia and fibula—macerated, showing the above. The fragments are wired together.

"This may give a picture of the state of the French wounded (Waterloo), who were brought into Brussels upon waggons, fourteen days after the battle, and were never dressed before that time" (Sir Charles Bell).

The part of the tibia struck has been comminuted into many pieces, most of which are loose. Fissures, however, do not run beyond the shaft. The fibula has been broken across.

The surface of the main fragments of the tibia, as well as of some of the smaller pieces, indicates suppuration and inflammation as in 3. 344. B. C. XVII. 44.

3. 360. Gunshot Fracture of the Tibia and Fibula.—Lower three-fourths of a right tibia and fibula—macerated, showing the above.

The patient was wounded at Waterloo by a musket ball, and received no assistance whatever until fourteen days after the battle. The limb was amputated at the Gendarmerie.

It may be noted that while the part of the tibia struck by the ball has been comminuted into small pieces, the remaining portions of the shaft are unaffected, with the exception of one fissure on the lower piece. A slight crust of new periosteal bone has formed on the main portions of the shaft, as in the previous case. B. C. XVII. 45.

3. 361. Gunshot Fracture of the Shaft of the Tibia and Fibula.—Portions of a right tibia and fibula—macerated, showing the above.

"Example of the effect of a ball striking the cylinder of the tibia." Like the two previous specimens, this one shows comminution at the point struck, with little or no splitting of the remainder. The slight crust of new periosteal bone indicates a similar period of about fourteen days before the limb was amputated. B. C. XVII. 46.

3. 362. Gunshot Fracture of the Shaft of the Tibia.—Small portions of a tibia driven off by a musket shot—macerated. B. C. XVII. 48.

3. 363. Gunshot Fracture of the Tibia and Fibula.—

Lower three-fourths of a right tibia and fibula—macerated, showing the above. The fragments are wired in position.

"The fracture of the tibia and fibula would not have warranted amputation, had the foot not also been shattered. *Remark.*—Indeed, if the majority of these cases of gunshot fracture had been treated early, and free incisions made down to the bone, many of them might have done well, without amputation. It was the circumstances in which they were found that made amputation necessary, and at the same time almost a hopeless measure" (Sir Charles Bell).

The fibula is broken irregularly, and the tibia comminuted.

The comminution of the tibia, however, is less than in the previous specimens, but the splitting of the remaining portions of the shaft is somewhat more extensive. A layer of newly formed periosteal bone, slightly thicker than in the preceding specimens, is seen above and below the seat of injury.

B. C. XVII. 47.

3. 364. Gunshot Fracture of the Tibia.—Upper end of a left tibia—macerated, to show the above. One loose piece is wired in position.

The wound was received at Waterloo.

Necrosis has been present at the seat of fracture, and the line of separation has begun. New periosteal bone has been thrown out on the adjacent portion of the shaft.

F. P. C. 252.

Presented by Professor JOHN THOMSON.

3. 365. Gunshot Fracture of the Tibia.—Portion of the shaft of a tibia—macerated, showing the above.

The patient was wounded at Waterloo.

The features of this specimen are essentially similar to those of the foregoing, there being indications of a septic compound fracture. Necrosis has begun at the seat of fracture, and new periosteal bone has been thrown out on the adjacent portion of the shaft.

F. P. C. 251.

Presented by Professor JOHN THOMSON.

3.366. United Gunshot Fracture of the Tibia.—Left tibia and fibula—macerated, showing the above.

The man was wounded in the American War (of Independence) and died in the Middlesex Hospital."

The lower end of the upper fragment of the tibia has been tilted outwards and backwards. There is much callus at the seat of injury, and a bar of new bone unites the fibula to the tibia. There is considerable irregularity of the head of the fibula.

B. C. XVII. 34.

3. 367. Old-standing Gunshot Fracture of the Fibula, followed by Tuberculosis.—Lower half of a left tibia and fibula, with the foot partially macerated and dried, to show the above.

"The leg at last fell into the state of a scrofulous joint, and was amputated."

The fibula has evidently been broken two or three inches above the ankle, and has been united by a bar of new bone. The front of the lower fragment is somewhat opened out and carious. The shafts of the tibia and fibula above the seat of fracture show very little deposit of new bone.

B. C. XVII. 35.

3. 368. Old-standing Gunshot Fracture of the Fibula, followed by Tuberculosis.—Oil painting by Sir Charles Bell of the leg and foot from which the foregoing specimen was taken.

The ulcer was considered scrofulous. There was also considerable swelling of the leg in the neighbourhood.

B. C. XVII. 36.

3. 369. Gunshot Fracture of the Tarsus.—Astragalus, greater part of os calcis, and portion of the first metatarsal bone—macerated, showing the above.

A distorted bullet is mounted along with the fragments. A portion of the outer shell of the os calcis has been torn off.

B. C. XVII. 40.

3. 370. Old-standing Gunshot Injury of the Tarsus.—Irregular mass of bone, representing a right cuboid and other tarsal bones, now almost unrecognisable—macerated, to show the above.

The cuboid in front is easily recognisable. Behind it is an irregular mass, apparently to a large extent of new formation. Probably the greater part of the bone behind the cuboid has been newly formed from the periosteum of the os calcis, parts of which can still be recognised. A piece of lead is firmly embedded in the under surface of the new mass.

B. C. XVII. 60.

3. 371. Gunshot Fracture of the Sternum.—Piece of bone, apparently chiefly of new formation, said to be an exfoliation after a gunshot wound of the sternum. B. C. XVII. 48.

3. 372. Gunshot Injury of Bone.—Two leaden bullets showing the diversity of forms which balls take after hitting a bone; also a macerated portion of detached bone with an osseous crust upon it.

B. C. XVII. 49.

3. 373. Gunshot Injury of Bone.—Musket balls altered in shape, found in wounds.

These were extracted from wounds received at Waterloo.

They are variously altered in shape by having struck bone.

F. P. C. 264.

Presented by Professor JOHN THOMSON.

3. 374. Gunshot Injury of Bone.—"Portions of a bullet found in John Bevet's femur. See Case III." (?) G. C. 3556.

3. 375. Gunshot Injury of Bone.—Small shot, distorted in shape, taken from the knee of Robert Robb, Royal Infirmary, 23rd October 1824. F. P. C. 261.

3. 376. Gunshot Wounds.—One leaden, and four larger iron balls, and one large irregular piece of iron, found in wounds. B. C. XVII. 57.

3. 377. Gunshot Injury of the Face by Explosion.—Cast of the breech of a gun.

The original was removed from the superior maxilla of William Roberts, of Powgus, Newfoundland, by Dr Fraser on the 19th of June 1856. G. C. 2403.

Presented by Professor MILLER, Nov. 1856.

FROM THE CRIMEA.

3. 378. Comminuted Gunshot Fracture of the Shaft of the Femur—Lower two-thirds of a left femur—macerated, to show the above. Loose fragments are wired in position.

"The femur is much comminuted between the lower and middle thirds, callus has been thrown out, enclosing large pieces of dead bone and part of the ball. The history of the case was as follows:—

"J. B., æt. 34, a private in the Grenadier Guards, was wounded at the battle of Alma, on the 20th September 1854. He was in the act of advancing when he was struck by a rifle ball, which entered the outside, between the lower and middle thirds. Little blood was lost; he felt as if he had been struck with a stick. He reeled a short distance in front of the line and fell. Four days afterwards, when on board ship, the ball was removed by making an incision at the opposite side of the thigh. When Dr Greig got charge of him at Scutari (12th November) he was in a very weak

condition—pus was discharging copiously from the wound on the outside of the thigh, and it was with difficulty that the long splint could be kept applied. No union whatever seemed to have taken place, which opinion was confirmed on the 22nd by making an examination while the patient was under chloroform. As the patient was getting every day weaker, the limb was amputated on the 23rd, above the seat of fracture. Although still weak, he continued to improve for two weeks, and hopes were entertained that he would do well. Unfortunately, hectic fever came on, and he sank about a month after the amputation." (*Vide* "Edinburgh Medical Journal," January 1857.)

The fracture has been about the middle of the shaft, and the bone has been severely comminuted. Upon two of the fragments, at the outer side, there is the appearance of a circular aperture, possibly where the bone was struck. These two fragments, as well as others near, have necrosed, and have been separated from the surrounding bone by granulation. Upon the main piece of the shaft, near the seat of fracture, a few spicules of necrosis in process of separation are seen, and also an irregular crust of periosteal bone, which in some places is heaped up to a considerable height. G. C. 2415.

Presented by DAVID GREIG, F.R.C.S.E., Dundee.

GUNSHOT FRACTURES FROM THE AMERICAN WAR, 1861-1865.

The following twelve specimens were obtained from the battle-fields of Manassas, Spottsylvania, and Petersburg, and were presented to the Museum by Surgeon-General Billings, Superintendent of the Army Medical Museum, Washington. They may be considered typical specimens of their kind, illustrating the form of injuries produced by rifle bullets in the late American War.

3. 379. Gunshot Fracture of the Shaft of a Femur.—Lower half of a right femur comminuted above the condyles—macerated, the fragments wired together.

There is an oval aperture on the front, about three inches above the level of the condyles, with its edges somewhat bevelled internally and sharp externally. On the posterior aspect is another irregular aperture, at a higher level, and further out than the other, and with its margins bevelled externally. The bone in the neighbourhood is broken up into numerous

fragments, larger in front and on the sides, and smaller on the back. There are only one or two fissures extending beyond the comminuted portion, and these only for about one inch. Probably the musket ball struck the femur obliquely, and passed from the front upwards and outwards, carrying some of the bone before it.

G. C. 3423.

Presented by Surgeon-General Billings, U.S.A.

3. 380. Gunshot Fracture of the Femur, involving the Knee-joint.—Lower end of a right femur, severely injured.

Just above the condyles on the back the cancellous tissue is wanting, apparently having been transversely ploughed up by the bullet. The bone is broken across a little above this level, and a large piece has been driven out of the inner side. The inner condyle has been detached. On the outer side, the lower part of the aperture is somewhat circular, and its margins are indented. The injury has evidently been caused by a musket-ball striking the outer side about one inch above the outer condyle.

G. C. 3424.

Presented by Surgeon-General Billings, U.S.A.

3. 381. Gunshot Fracture of the Femur, involving the Knee-joint.—Bones forming a left knee-joint—macerated, showing the above.

The bone has been irregularly ploughed up and broken across, just above the articular surface. The outer shell of the cancellous tissue has been split and turned aside at one place, and the upper margin of the patella has been injured.

G. C. 3425.

Presented by Surgeon-General Billings, U.S.A.

3. 382. Bullet lodged in the Outer Condyle of the Femur.—Bones forming a right knee-joint—macerated, showing the bullet in position.

The bullet still preserves its conical shape, although it has been rendered irregular by impact against the bone. It has forced itself partly into the outer condyle, and has partly split it off. The bullet, however, has had but a shallow bed, and, except for the surrounding soft parts, must have been loose. It is now held in place by a wire. G. C. 3426.

Presented by Surgeon-General BILLINGS, U.S.A.

3. 383. Gunshot Fracture of the Upper End of the Tibia and Fibula.—Upper end of a right tibia and corresponding part of the fibula, except the head, which is wanting. The specimen is macerated, and the fragments wired together, to show the above.

There is great comminution of the tibia, and loss of substance. An irregular hole, larger on the outer side, is seen on either side of the tibia, below the articular surface. The surrounding bone is comminuted into numerous fragments, and the knee-joint has been extensively involved. G. C. 3427.

Presented by Surgeon-General BILLINGS, U.S.A.

3. 384. Lodging of a Bullet in the Head of the Tibia after Penetration.—Upper end of a left tibia and fibula—macerated, showing changes from the above injury.

A conical bullet is seen with its tip just emerging at the back of the inner tuberosity, having passed obliquely backwards from the front and outer side. There is considerable loss of substance in the track of the bullet, which has split the bone, and, at the back, wedged the portions aside. The splitting extends for about four and a half inches down the shaft. Some cloth surrounds the back of the bullet, having evidently been carried in with it. G. C. 3428.

Presented by Surgeon-General BILLINGS, U.S.A.

3. 385. Gunshot Fracture of the Tuberosities of the Tibia.—Upper half of a right tibia—macerated, to show the effects of the above injury and the commencement of repair.

There is an irregular aperture below the front of the inner tuberosity, and another at a higher level, below the back of the outer tuberosity. The front aperture is the larger, but pieces of bone split off near the back aperture have been reuniting in their original position, thus making it seem unduly small. The bone is fissured into the knee-joint, and for about six inches down the shaft. There is new periosteal bone round the seat of injury and partly filling up the fissures. These changes must have occupied several weeks. G. C. 3429.

Presented by Surgeon-General Billings, U.S.A.

3. 386. Gunshot Fracture through the Tuberosity of the Tibia.—Upper end of a left tibia—macerated. The injury is similar to the last.

The bullet has struck the front of the outer tuberosity and has emerged at the back of the inner tuberosity, at a higher level. There is a small somewhat circular aperture in front and one larger and more irregular behind. A piece of bone split off at the back has been attached by a wire. The splitting passed into the knee-joint and shaft. Some new bone has formed round the seat of injury. G. C. 3430.

Presented by Surgeon-General Billings, U.S.A.

3. 387. Gunshot Fracture of the Upper End of the Shaft of a Tibia.—Upper two-thirds of a right tibia and fibula—macerated, with fragments wired together.

On the inner side of the shaft of the tibia, three inches below the tuberosity, there is a somewhat circular aperture, with its margins bevelled towards the interior of the bone. On the outer side a large irregular gap is seen, with its margins in places bevelled outwards. The bone surrounding these aper-

tures is greatly comminuted, especially at the back and outer side, but there is comparatively little splitting upwards, and none downwards beyond the fragments. The fibula is broken a little above the point where the bullet struck the tibia, and may have been secondary to the fracture of the tibia. Some new periosteal bone has formed at and near the injured places. The bullet evidently struck the tibia from the outer side, and carried away bone before it on the inside. G. C. 3431.

Presented by Surgeon-General BILLINGS, U.S.A.

3. 388. Gunshot Fracture of the Lower End of the Tibia.—Lower end of a left tibia and fibula—macerated, with the fragments wired together.

There is an irregular aperture in front of the tibia two inches above the articular surface. The margins are bevelled towards the inside. At the back of the bone opposite there is another aperture, somewhat smaller and more irregular than that in front, with its margins bevelled externally. The inner malleolus and half of the articular surface is split off from the rest of the bone, and the fissures extend upwards into the shaft for some inches above the seat of injury. The bullet has evidently struck the leg from the front and outer side, and has passed backwards and slightly downwards. G. C. 3432.

Presented by Surgeon-General BILLINGS, U.S.A.

3. 389. Gunshot Fracture of the Bones forming the Ankle-Joint.—Lower ends of a right tibia and fibula, with the astragalus and os calcis—macerated, showing the effects of gunshot injury at the back of the ankle.

The outer malleolus has been carried entirely away, and the adjacent parts of the astragalus and tibia are ploughed up. The ball has apparently passed obliquely from before backwards. G. C. 3433.

Presented by Surgeon-General BILLINGS, U.S.A.

3. 390. Gunshot Shattering of Foot.—Bones of a left foot—partially macerated and dried, and showing great laceration of the tarsus and lower end of the tibia.

The internal cuneiform bone, scaphoid, and astragalus are broken up into unrecognisable fragments, while the lower end of the tibia and sustentaculum tali of the os calcis have been severely comminuted. The other bones of the foot and the fibula have escaped. G. C. 3434.

Presented by Surgeon-General Billings, U.S.A.

COMPARATIVE PATHOLOGY OF FRACTURES.

3. 391. Process of Union after Fracture in the Bones of Birds.—Two humeri, also portions of a metatarsal bone and of the tibia and fibula of two chickens—macerated, after experimental fracture.

No account is given of the details of the experiments, but the specimens all show development of callus round the broken ends. The uppermost specimen shows enlargement of the lower half of the bone. Both the humeri exhibit a closing of the medullary cavity in the upper fragment, and the three lower broken bones show necrosis at the seat of fracture, with much new bone formed round it. G. C. 206.

3. 392. United Fractures in the Bones of Birds.—Series of sections through united fractures of three bones, apparently femora, of fowls—macerated.

The bones have united in bad position in each case, but the overlapping ends have been covered in, and the interval between the bones filled up by cancellous tissue. In the sections of the two lower fractures the original shell is distinguishable at the point of fracture, but in the uppermost fracture its two sections show the original shell to have become blended with the intervening cancellous tissue. G. C. 3528.

3. 393. United Fracture of the Femur of a Domestic Fowl.—Right femur of a domestic fowl—macerated, showing the mode of union. The broken ends have overlapped greatly, and the lower fragment has been rotated outwards. A bridge of new bone unites the adjacent parts, and the medullary cavity in each case has been covered in by new bone. G. C. 1540.

Presented by Dr Gairdner.

3. 394. United Fracture of the Tibia of a Pheasant.—Right and left tibia and fibula of a pheasant—macerated, showing a united fracture of the right.

The bone is shortened by half an inch, and there is a great deal of thickening round the seat of fracture. G. C. 3256.

Presented by Charles W. Cathcart, F.R.C.S.E.

3. 395. Ununited Fracture of the Neck of a Fox's Femur. Left femur of a fox—macerated, showing changes following the above injury.

The neck of the bone has entirely disappeared, but at the seat of fracture much irregular new bone has been thrown out, and partly fills the hollow of the great trochanter. The adjacent surfaces of the remains of the head and of the root of the neck have been eburnated by friction. The remains of the head, which was loose, and is now attached to the bone by a wire, shows great irregularity of the articular surface. These changes resemble those found in arthritis deformans. G. C. 1754.

Presented by Robert Hood, M.D., October 1835.

3. 396. Compound Fracture of the Femur of a Rabbit.—Left femur, apparently of a rabbit—macerated, showing changes after the above injury.

At the seat of fracture some of the original shaft is shown,

and has apparently necrosed, for it is in process of separation. Near the necrosed portions there is much thickening by development of new bone in the extremity of the lower piece, even down to the knee-joint. G. C. 3529.

3. 397. United Fracture of the Femur of a Small Quadruped.—Right and left femur of a small quadruped—macerated.

The right bone is thickened over its whole extent, and the sharp ledge formed in its upper third is evidently due to fracture at that point. G. C. 3530.

3. 398. United Fracture of the Spine of a Cat.—Part of the spine of a cat—macerated.

The specimen shows great alteration from the above injury. At one place the bodies of the vertebræ have been completely dislocated, and their ends overlap. Much new bone has been thrown out in the neighbourhood. The spinal cord must have been completely torn across. G. C. 3531.

Presented by Dr Abercromby.

3. 399. Lodging of a Bullet in the Femur of a Deer.—Lower end of the right femur of a red deer—macerated, showing a round bullet, and the condition of the surrounding bone.

From the fact that round bullets had been disused for many years before the animal was killed, also from the appearance of the parts, the bullet must have lain in its position for a long time. Except for the original injury, the bullet must have caused the animal very little inconvenience.

There is some irregularity of bone in the neighbourhood, but no appearance of any chronic irritation. G. C. 3079.

Presented by Charles M'Hardie, Gillie, Braemar.

SERIES 4. STRUCTURE OF JOINTS.

4. 1. **Sterno-clavicular Joint.**—Dissection illustrating the structure of the above—in spirit. G. C. 3562.

4. 2. **Ligaments of the Outer End of the Clavicle, and of the Shoulder-Joint.**—Dissection illustrating the structure of the above—in spirit. B. C. II. N. 2.

4. 3. **Shoulder-Joint.**—Dissection of a shoulder-joint in which the synovial cavity has been distended with paraffin coloured blue—in spirit. G. C. 3563.

4. 4. **Elbow-Joint.**—Dissection of an injected elbow-joint, illustrating the lateral and anterior ligaments—in spirit. B. C. II. N. 3.

4. 5. **Elbow-Joint.**—Dissection illustrating the structure of the above—in spirit. G. C. 3564.

4. 6. **Lower Radio-ulnar Joint.**—Dissection to show the tri-

angular fibro-cartilage between the lower ends of the radius and ulna—in spirit. B. C. II. N. 4.

4. 7. Carpal Joints.—Dissection of an injected preparation, showing the articular surfaces and some of the ligaments of the carpus. B. C. II. N. 5.

4. 8. Joints of the Hand.—Dissection illustrating the joints of the wrist and carpus. G. C. 3565.

4. 9. Joints of the Fingers.—Dissection illustrating the above, —in spirit. G. C. 3566.

4. 10. Ligaments of the Thumb.—Dissection illustrating the lateral ligaments of the joints of the thumb. B. C. II. N. 8.

4. 11. Ligaments of the Pelvis.—Dissection illustrating the above—in spirit. G. C. 3567.

4. 12. Ligaments of the Pelvis.—Dissection illustrating the above—in spirit. G. C. 3568.

4. 13. Ligaments of the Pelvis.—Dissection illustrating the above—in spirit. G. C. 3569.

4. 14. Symphysis Pubis.—Two sections of the symphysis pubis, to illustrate the above—in spirit. B. C. II. N. 12.

4. 15. Hip-Joint.—Acetabulum, dissected to show the cotyloid and transverse ligaments. B. C. II. N. 14.

4. 16. Hip-Joint.—Dissection of the hip-joint—injected, showing the ligamentum teres and the ligaments on the back and upper parts, the front of the capsule having been removed—in spirit. B. C. II. N. 13.

4. 17. Hip-Joint.—Preparation of the ilium and adjacent part of the femur. The bones are macerated, and the ligaments dried and painted.

These ligaments are, particularly, the "ischio-femoral band," described by Dr Struthers ("Edinburgh Medical Journal," 1858), passing spirally at the back from the ischium to the fore-part of the great trochanter, and so placed as to check rotation inwards during flexion. The ligamentum teres, exposed by Dr Struthers' method, is seen not to be tense, and to lie out of its functional groove, in the erect posture. G. C. 3467.

Presented by Professor STRUTHERS.

4. 18. Hip-Joint.—Dissection illustrating the structure of the above. G. C. 3570.

4. 19. Knee-Joint.—Dissection of an injected preparation, especially illustrating the sub-patellar pad of fat and ligamentum mucosum, as well as the lateral and crucial ligaments from behind. B. C. II. N. 19.

4. 20. Knee-Joint.—Dissection of a left knee-joint, to show the attachment of the crucial ligaments—in spirit. B. C. II. N. 17.

4. 21. Knee-Joint.—Dissection of a left knee-joint, to show the position of the semi-lunar cartilages in relation to the crucial ligaments—in spirit. The patella has been turned downwards, and the coronary and transverse ligaments have been dissected away, and only portions of the lateral ligaments left.

B. C. II. N. 18.

4. 22. Knee-Joint.—Semi-lunar cartilages of a left knee-joint, removed along with the portion of the tibia to which their extremities are attached. B. C. II. N. 20.

4. 23. Knee-Joint.—Dissection of a knee-joint, to show the attachment of parts to the tibia. G. C. 3571.

4. 24. Knee-Joint. — Dissection of a knee-joint, to show the relations of the synovial membrane. G. C. 3572.

4. 25. Knee-Joint.—Patella, with the tendon of the quadriceps extensor, and ligamentum patellæ—in spirit. B. C. II. N. 15.

4. 26. Lower Tibio-fibular Articulation.—Lower end of tibia and fibula to show the interosseous ligaments—in spirit. On the outer and front part of the tibial articular surface there is a mark as if of an old fracture. B. C. II. N. 21.

4. 27. Ankle-Joint.—Dissection of the lateral ligaments of the ankle-joint—in spirit. G. C. 3573.

4. 28. Joints of the Ankle and Foot.—Dissection to illustrate the synovial cavities of the ankle and foot—in spirit.

G. C. 3574.

4. 29. Tarsal Joints.—Dissection to show the chief tarsal articulations—in spirit. G. C. 3575.

4. 30. Tarsal Articular Surfaces.—Dissection of the bones of the foot, to show the articular surfaces—in spirit.

B. C. II. N. 22.

4. 31. Articulations of the Great Toe.—Dissection of the bones of the great toe of a foot which had been injected, to illustrate chiefly the articular surfaces—in spirit.

B. C. II. N. 23.

4. 32. Great Toe Joint.—Section of joint between the great toe and first phalanx, showing the relation of parts—in spirit.

B. C. II. N. 24.

4. 33. Temporo-maxillary Articulation.—Preparations showing the inter-articular cartilage of the lower jaw—in spirit.

B. C. II. N. 11.

4. 34. Temporo-maxillary Articulation.—Preparation illustrating the ligaments of the above joint. G. C. 3576.

4. 35. Occipito Alto-axial Joint.—Dissection illustrating the above—in spirit.

G. C. 3577.

4. 36. Alto-axial Joint.—Dissection illustrating the above—in spirit. G. C. 3578.

4. 37. Inter-vertebral Joint.—Dissection showing some of the chief inter-vertebral ligaments. G. C. 3579.

4. 38. Inter-vertebral Substance.—Preparation of the inter-vertebral substance separated from the bone, showing the pulpy structure at the interior and the fibrous nature outside. B. C. II. N. 1.

SERIES 5. INJURIES OF JOINTS.

DISLOCATIONS OF THE CLAVICLE.

5. 1. Forward Dislocation of the Sternal End of the Clavicle.—Cast in glue and glycerine of the front of the chest of an adult, showing the above.

The patient, an elderly workman, was hit on the back of the right shoulder by a passing truck and knocked down. Under chloroform the dislocation was partially reduced, but it was found impossible to retain the bone properly in its place. The patient left the Hospital, however, with a fairly useful arm.

The projection of the sternal end of the right clavicle is well seen. G. C. 2858.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

DISLOCATIONS OF THE UPPER LIMB.

5. 2. Unreduced Sub-coracoid Dislocation of the Shoulder.—Left scapula—macerated, showing changes dependent on the above.

The inner margin of the glenoid cavity has been worn away, and the adjacent bone is rough and irregular. These changes have most probably followed an old-standing sub-coracoid dislocation of the humerus. B. C. II. M. 46.

5. 3. Unreduced Sub-coracoid Dislocation of the Shoulder.

—Left scapula, with adjacent parts of clavicle and humerus —in spirit, showing the above.

The inner margin of the glenoid cavity of the scapula is worn away, and the adjacent bone on the ventral surface is flat and smooth.

The greater part of the articular surface of the humerus is irregular, and covered by fibrous material. At the back of the greater tuberosity, the bone has been smoothed down by friction against the scapula, and near it there is a projecting spur of bone. Portion of a strong fibrous capsule is seen on the inner side of the head of the humerus. The bone forming the infra-spinatus fossa has been fractured, and has united with great irregularity. B. C. II. M. 44.

5. 4. Unreduced Sub-coracoid Dislocation of the Shoulder. —Right scapula and humerus—macerated, showing the above.

The specimen is from the same patient as the last.

Evidently on this side also there has been an unreduced dislocation. The original glenoid cavity is partly filled up by newly formed bone, and a new cavity has been formed inside, and below the level of the first one. The head of the humerus shows many alterations. The greater and lesser tuberosities have atrophied, and their surfaces pass insensibly into those of the shaft and head respectively. The articular surface of the head is irregular, and a mass of new bone has been thrown out at the outer and back part of the surgical neck. The surface of this new piece is porous, and the intervals between the small holes are at places eburnated. This condition resembles that often produced by arthritis deformans upon the head of the femur. B. C. II. M. 45.

5. 5. Old-standing Sub-coracoid Dislocation of the Shoulder.—Right scapula, with adjacent portions of the humerus and clavicle, from a person aged 76 years.

There is an unreduced sub-coracoid dislocation of the humerus, and the edge of the glenoid cavity has caused a depression upon the back of the anatomical neck. This part of the bone is elongated, so that the neck of this humerus almost resembles that of a femur. These changes may have been produced by a splitting of the great tuberosity against the edge of the glenoid cavity at the time of the accident, and afterwards by absorption from pressure and some new formation. (See paper by Caird, "Edinburgh Medical Journal," 1886.) The original glenoid cavity is partially filled up, and an imperfect new one has been formed below the coracoid process.

G. C. 3468.

Presented by Professor STRUTHERS, January 1893.

5. 6. Double Sub-coracoid Dislocation of the Shoulder.—Plaster of Paris cast of the front of the chest and shoulders of an adult, showing the above.

The dislocation on the right side was recent, that on the left side was old-standing.

It may be noted that the unreduced dislocations, Nos. 5. 3 and 5. 4 were also from one person. G. C. 2678.

Presented by J. D. GILLESPIE, F.R.C.S.E.

5. 7. Old-standing Sub-glenoid Dislocation of the Shoulders.—Plaster of Paris cast of the upper part of the chest and shoulders of an adult, showing the above.

The appearances on the left side are characteristic of old-standing dislocation. G. C. 3306.

5. 8. Sub-spinous Dislocation of the Shoulder.—Right scapula and upper part of humerus, with the muscles partly dissected—in spirit, to show the above.

The patient, a strong man, had fallen over a great height, and had received severe internal injuries, from which he died shortly after his admission into the Royal Infirmary.

The deltoid has been thrown down to expose the region of the shoulder. The head of the humerus was displaced backwards into the infra-spinatus fossa, and is seen lying on the infra-spinatus muscle. The capsule of the shoulder-joint and the attachment of all the muscles to the two tuberosities, except a small portion of the teres minor, were completely torn off. The surrounding muscles and areolar tissue were infiltrated with blood. Prepared by G. Hardyman, M.B. G. C. 3580.

Presented by H. P. Miller, F.R.C.S.E.

5. 9. Forward Dislocation of the Head of the Radius.—Glue and glycerine cast of a fore-arm and part of an upper arm, showing the above.

The bone had been dislocated some years before, and had never been reduced. The arm was, however, quite useful, except that flexion was limited.

The cast shows the projection of the head of the radius, which occurred during flexion. G. C. 3202.

Presented by Charles W. Cathcart, F.R.C.S.E.

DISLOCATION OF THE HAND AND FINGERS.

5. 10. Backward Dislocation of the Second Metacarpal Bone.—Cast, in glue and glycerine, of a right hand, showing the above.

The patient was a ticket-of-leave man. The accident occurred in the course of a fight. An attempt at reduction without chloroform failed, and the patient left the Infirmary before any further treatment could be tried.

The cast shows the projection of the base of the bone at the carpus, and the sinking in of the head of the bone at the knuckle. G. C. 2867.

Presented by Charles W. Cathcart, F.R.C.S.E.

5. 11. Backward Dislocation of the Second Metacarpal Bone.—Cast, in glue and glycerine, of left hand of the above patient, as a contrast with the injured side. G. C. 2868.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

5. 12. Forward Dislocation of the First Phalanx of the Thumb.—Plaster of Paris cast of a right hand, showing the above.

The cast was taken from the hand of a pugilist named Wood, but there exists no history as to how the accident occurred.

B. C. II. M. 61.

DISLOCATIONS OF THE LOWER LIMB.

5. 13. Dislocation on to the Dorsum Ilii.—Plaster of Paris cast of a left innominate bone and upper end of the corresponding femur, showing the above.

The head of the bone has lain on the dorsum ilii, just above the acetabulum. The femur has been greatly flexed and adducted.

G. C. 3087.

Copied by permission from a specimen in Professor ANNANDALE'S Museum.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

5. 14. Unreduced Dislocation on to the Dorsum Ilii.—Portion of a left innominate bone and corresponding end of femur—muscles dissected off, in spirit—showing the above.

The specimen was taken from a dissecting-room subject.

The original acetabulum is nearly filled up by fibrous tissue, and just above it, on the dorsum ilii, depression has been formed by the head of the bone in its new position

The greater part of the head and neck of the femur have disappeared, but the small trochanter is enlarged.

A strong band of fibrous tissue unites the under surface of the remains of the neck of the femur with the upper part of the old acetabulum. B. C. II. M. 13.

5. 15. Unreduced Thyroid Dislocation.—Plaster cast of a left innominate bone and upper end of the corresponding femur, showing the above. The head of the bone has formed for itself in the thyroid foramen a new socket, which has encroached upon the acetabulum. G. C. 1931.

Presented by J. A. ROBERTSON, F.R.C.S.E., **1838.**

DISLOCATION OF THE PATELLA.

5. 16. Outward Dislocation of the Patella.—Condyles of a left femur, with a greatly altered patella—macerated, showing the above.

The condition has evidently been of many years' standing. The articular surfaces of the femur are irregular, and much new bone has been thrown out round the margins. The anterior surface of the patella is unchanged, but on the posterior or articular surface a large mass of new bone has been formed, and has adapted itself to its new position on the outer condyle without adhering to it. Many of the changes seen on the articular surfaces of the femur resemble those found in arthritis deformans. B. C. II. M. 27.

5. 17. Vertical Dislocation of the Patella.—Plaster of Paris cast of a right knee, showing the above.

The patella has been twisted, so as to rest upon its outer edge against the trochlear surface of the femur. G. C. 2477.

Presented by C. DARUTY, L.R.C.S.E.

DISLOCATION OF THE KNEE.

5. 18. Partial Outward Dislocation of the Knee.—Plaster cast of a right knee, showing the above.

The skin was drawn very tightly over the inner condyle, and would have sloughed had reduction not been effected. The tibia and fibula have been displaced outwards and backwards.

G. C. 3112.

Presented by ALEXIS THOMSON, F.R.C.S.E.

5. 19. Compound Dislocation of the Knee.—Plaster cast of a right knee, showing the above.

The ligament was torn, and the skin on the inner side ruptured so as to expose the interior of the knee-joint. The tibia and fibula have been displaced inwards and backwards.

5. 20. Partial Outward Dislocation of the Tibia and Fibula.—Glue and glycerine cast of a left knee, showing the above.

Four years before, the patient, a young man, then aged 20, had struck his knee in trying to jump into a cart. Several ineffectual attempts had been made to reduce the deformity. The joint subsequently became affected with tubercular disease, and shortly after the cast was taken the joint was successfully excised by Mr A. G. Culter. (See Series 7.)

The cast shows a slight outward dislocation of the tibia, but the relation of the parts was masked by swelling of the synovial membrane.

G. C. 2891.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

DISLOCATION OF THE FOOT.

5. 21. Compound Sub-astragaloid Dislocation.—Right foot and lower part of leg, muscles and tendons dissected, to illustrate the above—in spirit.

Amputation was performed through the leg.

The tendons are not much displaced. The astragalus has preserved its relation to the tibia and fibula, but has been torn from its attachments to the scaphoid and os calcis. The foot has been twisted inwards, so as to leave the head of the astragalus projecting on the outside. G. C. 1431.

Presented by BENJAMIN BELL, F.R.C.S.E., **1827.**

5. 22. Compound Sub-astragaloid Dislocation.—Plaster cast, coated with wax and painted, illustrating the condition of the foregoing specimen immediately after amputation. The head of the astragalus is seen protruding through the skin. G. C. 1432.

Presented by BENJAMIN BELL, F.R.C.S.E., **1827.**

5. 23. Compound Sub-astragaloid Dislocation.—Plaster cast, coated with wax and painted, illustrating the condition of the same specimen after removal of the skin. G. C. 1433.

Presented by BENJAMIN BELL, F.R.C.S.E., **1827.**

5. 24. Dislocation of the First Metatarsal Bone.—First metatarsal bone from the right side of a young person—macerated.

The bone was forced out of its place by the tramp of a horse. The patient recovered from the injury, and the movements of the foot were afterwards unimpaired.

The bone itself does not seem to have been injured. G. C. 1163.

Presented by Professor JAMES RUSSELL, F.R.C.S.E.

SERIES 6. DISEASES OF BONE.

I. ABNORMALITIES IN GROWTH OR DEVELOPMENT.

6. 1. Abnormal Development of Skeleton.—Skeleton of an Anencephalic male fœtus—macerated, showing the above.

The cranial bones are imperfectly developed, and the vault of the skull is very shallow and quite deficient at the vertex. The parietal bones are feebly developed, while there is a large gap corresponding to the foramen magnum. There are six digits on each hand and foot, the extra one being supernumerary to the fifth in each case. In both hands the extra digit arises from the fifth metacarpal bone, which is unduly broad. A similar arrangement is seen on the left foot, but on the right foot the fifth metatarsal bone is double. The radius on each side is somewhat bent and flattened, and the tibiæ are broad and somewhat bent. In other respects the skeleton seems well developed. G. C. 3494.

Presented by Alexis Thomson, F.R.C.S.E, **1893.**

6. 2. Abnormal Development of Skeleton.—Three photographs of the above fœtus, showing the appearances presented before dissection.

The relative shortness of the lower limbs and their somewhat inverted position should be noted. The bloated appearance of the features in the front and side views is clearly demonstrated, and in the profile view the relative smallness of the cranium and the protrusion of brain and membranes through the vertex is well shown. G. C. 3495.

Presented by Alexis Thomson, F.R.C.S.E., **1893.**

6. 3. Imperfect Development of the Arch of the Atlas.—Atlas vertebra from an adult—macerated, illustrating the above.

The bone seems well developed, except that the arch is incomplete on the right side, near its junction with the lateral mass. G. C. 992.

6. 4. Cervical Rib.—Right first rib of an adult, with an extra rib fused to it—macerated.

The first rib itself has a ridge for the attachment of the scalenus anticus muscle, with a groove in front and behind it. The ridge separating these two grooves runs in the direction of the extra rib. The extra rib has a well-marked head, neck, and tubercule, with about one inch of a body, before it blends with the first rib. The place of junction is much flattened, and on the inner side is prolonged into a flattened spike, directed forwards and inwards. G. C. 3533.

II. CHANGES PRODUCED BY CONDITIONS AFFECTING THE NUTRITION OF BONE.

A. *Changes in old age.*

6. 5. Change in the Humerus from Old Age.—Upper end of a right humerus, in section—macerated, to show the above.

The bone was very greasy, and was with difficulty cleaned of fat and oil. The compact tissue of the shaft is diminished in thickness. There is considerable atrophy of the cancellous tissue at the upper end, and the whole texture of the bone is lighter and more friable than in the adult condition. The changes in this bone may be taken as characteristic of those found in the long bones of old people, when senile decay has appeared. G. C. 3334.

Presented by MACDONALD BROWN, F.R.C.S.E.

6. 6. Senile Osteo-malacia of the Femur.—Longitudinal sections of the left femur of an old woman, showing the above.

The patient was bed-ridden in the workhouse, and all her bones showed a similar change.

The bone is much lighter and more fragile than usual, and in places at either end could easily be marked with the finger-nail. The outer wall of bone has been reduced to a mere shell, except at the upper end of the shaft, and there the bone tissue, although thicker than elsewhere, is opened out almost into cancellated tissue.

The cancellated tissue at the extremities is extremely light and delicate, and in places has disappeared.

On the surface the marks of muscular attachments are less prominent than usual, and in places the surface is porous.

When fresh, the interior of the bone was filled by a reddish-brown jelly-like material which had replaced the marrow, except at the middle of the shaft. It was not greasy.

The bone was easily macerated, and is quite dry, except at the lower end, where it is slightly oily. The angle which the neck forms with the shaft does not seem altered, possibly because the patient was bed-ridden some time before her death. G. C. 3222.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1891.**

6. 7. Senile Osteo-malacia of the Tibia.—Sections of the left tibia from the same patient—macerated, to show the above.

The bone shows characteristic changes, in all respects similar to those seen in the previous specimen. G. C. 3223.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1891.**

6. 8. Senile Osteo-malacia of the Sacrum and Coccyx.—Sacrum, coccyx, and last two lumbar vertebræ, from the same patient—macerated, to show the above.

The lower part of the sacrum is bent sharply forwards, at about a right angle to the rest of the bone.

The cancellated tissue is very delicate and friable, so much so that the ossa innominata came to pieces during maceration. The pelvis was peaked as in osteo-malacia, but there was none of the greasiness found in that condition. G. C. 3228.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 9. Senile Osteo-malacia of the Scapula.—Right scapula from the same patient—macerated, to show the above. The spine and superior angle were broken in removing the soft parts.

This bone shows characteristics similar to those seen in the other bones of this subject, and the greater part of the venter is as thin as paper. G. C. 3227.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 10. Senile Osteo-malacia of the Clavicle.—Left clavicle from the same patient—macerated, to show the above.

Like the other bones from this subject, it is light and dry, and deficient in muscular markings. G. C. 3226.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

B. *Changes from various local conditions affecting the nutrition of bone.*

6. 11. Degeneration of the Os Calcis from Disease of other Bones of the Foot.—Section of a right os calcis—macerated, to illustrate the above condition. The bone remains saturated with oil, notwithstanding efforts to remove it.

The patient had suffered for many years from tuberculosis of the foot, affecting chiefly the soft parts, but extending to the tarsal and meta-tarsal bones at the outer side. The os calcis was not affected by the disease, and the changes seen were secondary to the real disease and quite distinct from it.

The bone tissue is very light, and is reduced to a transparent film in many places. G. C. 3310.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 12. Atrophy of the Tibia and Fibula, following Anchylosis of the Knee-joint from Disease.—Left tibia and fibula and lower end of corresponding femur and patella—macerated, to show the above. A portion has been removed from the head of the tibia to show the condition of the cancellous tissue. The bones are very greasy, and were made only tolerably clean after having been several times boiled in soda solution.

The patient had suffered from knee-joint disease, and many years before amputation the limb had become anchylosed in a flexed position. It was removed because it was in the way.

The shafts of both bones are diminished in size, and are bent slightly backwards. The compact tissue, however, is strong, and the bones are apparently not lightened in proportion to their diminished size. The section through the cancellous tissue shows it to be stronger and firmer in the epiphyses than in the upper part of the shaft. The patella has been anchylosed by bone to the femur. The articular surfaces of the femur and tibia are irregular, but without any sign of existing active disease. The changes in these bones may be attributed partly to disuse and partly to other results of the previous knee-joint disease. G. C. 3554.

Presented by A. G. Miller, F.R.C.S.E.

6. 13. Atrophy of the Bones of the Foot from Disuse.—Section of the bones of a right foot—macerated, to show the above.

The patient had been unable to walk properly for some years, owing to the gradual enlargement of a central sarcoma of the fibula, for which the leg was eventually amputated.

The texture of the bones is light and greasy.

G. C. 3235.

Presented by P. H. Watson, F.R.C.S.E.

6. 14. Atrophy of the Bones of Leg and Foot from Disuse,

following Anchylosis from Rheumatism.—Bones of a right leg and foot, soft parts cleaned off—dried, to show the above.

D. W., aged 18 years, was troubled with pains in the joints of his right foot at the age of 10. Shortly after this he was confined to bed for three months with a "fever" (probably rheumatic), which affected all the joints of his body. Two years later he had a relapse of the same fever, with implication of most of his joints, especially those of the right foot. Since then he has had several similar attacks, and, with the exception of the sterno-clavicular and temporo-maxillary, all the joints of his body have become deformed and more or less rigid. He has thus been completely crippled and helpless, even in bed. The right knee was excised on 10th May, but as the operation was unsuccessful, Professor Annandale performed amputation above the knee on 24th July.

The muscles of the leg, although greatly diminished in bulk, were of a fairly good colour. The periosteum stripped off very easily. The shafts of the tibia and fibula are much reduced in thickness, and the muscular markings are slight. The compact tissue is hard, but the cancellous tissue at the articular ends of the long bones and in the tarsal bones is extremely soft and fatty, and is surrounded by a scale of bone so thin and soft that it yields to the slightest pressure, and can be cut with the finger-nail. The joints of the ankle and tarsus are all anchylosed by bone, as are also those of the metatarsus, except that of the first metatarsal bone. The joint between the first and second phalanges of the great toe is anchylosed, but all the other phalangeal joints have a certain amount of movement. G. C. 3581.

Presented by Professor T. ANNANDALE, F.R.C.S.E.

6. 15. Atrophy and Alteration in the Bones of the Foot, following Injury.—Section of the bones of a right foot—macerated, showing the above.

The patient was a middle-aged man. Early in life his foot had been injured, and great distortion resulted (see G. C. 2818). The skin had been greatly destroyed, and an ulcer which appeared on the heel broke out from time to time, and caused so much inconvenience that on account of it the foot was at last amputated.

The metatarsals are extremely thin, and are ossified together at their bases. The three cuneiforms and the scaphoid are also ossified together. The os calcis and the cuboid are widely separated. The cancellated tissue is very light, and in many places has disappeared. The bones were fairly easily cleared of fat. G. C. 2820.

Presented by P. H. MACLAREN, F.R.C.S.E.

For other examples of atrophy from disuse, see "Stumps," series 11. For atrophy from continuous pressure, see series of General Pathology.

6. 16. Changes in Bone from Peripheral Nerve Lesion.—Specimen wanted.

C. *Changes from affections of the central nervous system.*

6. 17. Alterations in Skeleton in a Case of Paralysis and Idiocy.—Skeleton of a woman, showing the above. The following description has been kindly furnished by the donor.

"This specimen was obtained from the body of a woman aged 30, who died in the Norfolk County Asylum in 1891. Of a neurotic family, she was apparently healthy and well-formed at birth. When she was a year old, on attempting to stand, the weakness of the right arm and leg were noticed. The weakness increased, and the affected members became drawn up. She never walked. The recumbent position was adopted, and maintained from infancy till her death. She never moved the right arm or leg. She could move the head and grasp objects with the left hand. She suffered from convulsive fits from the age of 3 till the age of 26. She was a complete idiot."

"The skull is typically micro-cephalic; it is also asymmetrical, the right half of the cranial box being greater in its dimensions and more convexly arched than the left. This assymmetry is the result of a lesion in early life of the left cerebral hemisphere of the brain, whereby the growth of the latter was interfered with."

The bones of the trunk and extremities present features which are to be etiologically associated with a right-sided

hemiplegia occurring in infancy, together with uninterrupted recumbency in bed for nearly thirty years. Those features specially connected with the hemiplegia show themselves, especially in the bones of the right arm and leg, and to a very much less extent in the trunk; those features resulting from the recumbency and disuse are superadded to the former on the right side, but are also present in those of the left.

In the trunk there is no apparent asymmetry apart from the scoliosis. Those on the paralysed side do not suffer by comparison with those on the side which retained the power of movement.

The spinal column exhibits a type of curvature seldom met with, and in all probability only developed under conditions present in this case, *i.e.* paralysis of one side plus recumbency. That little movement took place during life is evidenced by the bony union of certain of the laminæ. The thorax has altered during the preparation of the specimen; it was scarcely, if at all, involved in the scoliosis; it was well formed, beyond a moderate flattening from before backwards.

The pelvis, of the female type, is most notably wasted and thinned; its diameters considerably altered.

The bones of the extremities are on both sides small, thin, and light, deficient in ridges and marks for muscular attachment, present a fairly developed cortical layer in the shafts of the long bones; the medulla and spongiosa very small in amount. The articular ends of the long bones and the short bones (*e.g.* tarsus) have but a thin and imperfect cortex, capable of being indented with the finger-nail. The ends of the long bones also present alterations resulting from the deformities to be presently described.

Those on the right (or paralysed) side not only present the above features in a greater degree, but show evidences of the nerve lesion. They are distinctly shorter. This, as shown by measurement, varies in the different bones. It is most pronounced in the following bones, and in the order given:— humerus, femur, fibula, radius, ulna, tibia, clavicle. It is

absent in the scapula, metacarpals, metatarsals, and phalanges. The bones on the right side are also less in girth than those on the left.

The changes in the ends of the bones, resulting from the deformities acquired in early life, are met with both on the right and on the left side, though much more pronounced in these of the former or paralysed side. They reach their acme in the lower extremities. The right hip-joint presents a complete dorsal dislocation of the head of the femur, with corresponding changes in the articular surfaces; at the left side the dislocation is only partial. The right knee-joint is flexed to such a degree that the articular surfaces of the condyles are not in contact with the tibia; the facets of the latter are in contact with the superior aspect of the posterior extremities of either condyle. On the left side the flexion is less pronounced and the leg is rotated outwards.

The right ankle-joint was acutely flexed, remarkable—seeing that the toes of paralysed limbs are usually pointed: the superior surface of the neck of the astragalus articulated with the anterior aspect of the shaft of the tibia. On the left side the toes were pointed.

In the upper extremities there are no evidences in the articular ends of the bones of the large joints of the contracture deformities on the right side, corresponding to those in the lower extremity. The articular surfaces remain in contact with each other, and are covered with hyaline cartilage. The hand, however, on the right side, preserved in its original conditions, presents the usual features of hemiplegic contracture.

The brain.—See nervous system.

(For a more minute description of the above skeleton, see the description by Dr Alexis Thomson in *Journ. Anat. Phys.*)

G. C. 3496.

Prepared and presented by Alexis Thomson, F.R.C.S.E.

6. 18. Alterations in Skeleton in a Case of Paralysis

and Idiocy.—Photograph of the anterior aspect of the patient from whom the foregoing specimen was taken, showing the condition immediately after death. G. C. 3498.

Presented by ALEXIS THOMSON, F.R.C.S.E.

6. 19. Alterations in Skeleton in a Case of Paralysis and Idiocy.—Photograph of the posterior aspect of the above patient, showing the condition immediately after death.

G. C. 3498.

Presented by ALEXIS THOMSON, F.R.C.S.E.

6. 20. Atrophy of the Bones of the Leg and Foot, from Infantile Paralysis.—Bones of the foot and lower two-thirds of tibia and fibula—partially macerated and cleaned, to show the above. The limb was soaked in Müller's fluid, which has turned the bones green.

The patient had been affected by infantile paralysis. In consequence, this leg and foot did not grow in proportion to the other one, and became useless. It was therefore amputated.

The bones are both somewhat bent outwards, as in No. 6. 12. The shafts of the tibia and fibula are thin, and the usual ridges are wanting. The compact tissue, however, is not atrophied in proportion to the diminished size. The bones of the foot are light and very greasy. G. C. 3555.

Presented by ALEXIS THOMSON, 1893.

6. 21. Alterations in Bone due to Locomotor-ataxia.—Specimen wanted.

D. *Alterations due to conditions apparently constitutional, but more or less obscure.*

(*a.*) *Rickets.*

6. 22. Rickets in the Tibia of a Child.—Section of the right

leg and foot of a child—injected, and in spirit, to show the above.

The child was about eight years of age. The leg was amputated for tubercular disease of the knee-joint.

The tibia is curved forwards. There is increased vascularity of the periosteum in the concavity of the arch, especially at its lower end. At the centre of the concavity the cancellous tissue is becoming condensed. Otherwise the bone shows no marked change. G. C. 3199.

Presented by A. G. Miller, F.R.C.S.E.

6. 23. Rickety Enlargement of the Radius and Ulna.—Cast—in glue and glycerine—of part of the left forearm and hand of a child, showing the above.

The enlargement of the lower end of the radius and ulna is unusually well marked. Both sides were alike.

G. C. 3245.

Presented by Charles W. Cathcart, F.R.C.S.E.

6. 24. Rickety Enlargement at the Ends of the Ribs.—Sternum, costal cartilages, and anterior ends of seven upper ribs of a child aged two years, showing the above.

The enlargement at the sternal ends of the ribs, known as the "Rickety Rosary," is very well shown. G. C. 2560.

Presented by R. Blair Cunynghame, F.R.C.S.E.

6. 25. Skeleton affected by Rickets.—Skeleton of a woman—showing the above—macerated.

She died in child-bed.

The bones are greatly altered, and the total height of the skeleton is 31½ inches, measuring from the top of the skull to the heel. The skull is well formed, but on section it is seen to be thickened, especially on the roof. The thickened bone is

spongy in character, and seems to occupy chiefly the middle and outer tables.

Upper Limbs.—The clavicles are thin, and their curves are somewhat exaggerated. Scapulæ.—The left scapula is small and thin, but otherwise normal in shape. The right is bent, so as to be concave forwards, but is otherwise unchanged. Owing to spinal curvature, it is placed higher than the left one. Humeri.—The humeri are each 8½ inches in length, and have an outward bend at the deltoid attachment, where also a special ridge is developed. The outer lip of the bicepital groove is very prominent. The heads of the bones are flattened from above downwards. The condyles at the elbow are unusually prominent. Forearms.—The bones of the forearms are thin and somewhat irregular in shape, with prominent ridges and enlargement of the lower ends of radii. The bones of the hands show no particular change. Spinal Column.—The spinal column presents an exaggerated degree of lateral curvature, convex to the right in the dorsal region, and to the left in the lumbar, with the usual rotation of the bodies of the vertebræ towards the convexity. Thorax.—The thorax presents the usual characters following upon lateral curvature, viz. on the right or convex side the angles of the ribs are exaggerated behind, and the ribs themselves seem unusually broad, while the curve is somewhat flattened in front; on the left or concave side the ribs are compressed together and narrowed at the concavity, their angles being flattened at the back and their curvature increased in front. Sternum.—The body of the sternum is oblique to the manubrium sterni. Pelvis.—The pelvis is altered partly by rickets and partly by lateral curvature. The bones are thin and light. The alæ of the ilium are ill developed and bent forward, somewhat like the osteo-malacian pelvis. The brim of the pelvis is contracted chiefly on the left side, where the acetabulum has been crushed up towards the sacrum.

Lower Limbs.—Femora.—The femora are very short, measuring from the top of the great trochanters to their lower end only about 9 inches. They are curved forwards and

outwards, are rotated outwards, and are flattened and enlarged at their lower ends. Tibæ and Fibulæ.—The tibiæ and fibulæ are bent almost completely double, so that the knees must have touched the outside of the foot during life. The bones of the feet are comparatively unaltered.

B. C. 1. 3. M. 24.

6. 26. Skeleton affected by Rickets.—Skeleton of a rickety woman (Christie Moore) showing alterations, chiefly in the limbs and pelvis.

"She was the little woman, with rather a good face, and a great deal of impudence, who generally stood at the Infirmary gate to talk to the students. She went with great velocity on her crutches. She had no motion in her legs separately, they being twisted together curiously. This made it the more extraordinary that she ever suffered as she did in child-bed. She was pregnant twice, and the first child was brought away at the eight months entire, but flattened. In her second labour I saw her. She had gone the full time. When I examined the head of the child, I found it perforated, and one of the parietal bones brought away. After this, the other parietal bone was brought away by the use of the crochet. The hook was then put into the foramen magnum and the base of the skull brought down obliquely, but the operator with all his force could not bring it through. This was on the second day of her labour. She was much exhausted. Her voice, however, was hale and strong, and she would talk in her usual style of impudence. She sank rather rapidly, and died undelivered. A model represents the appearance which presented on dissection." (See "Obstetrical Collection.")

The pelvis is greatly flattened. "It measures, between the sacrum and pubis, two fingers' breadth only, or an inch and a half, the transverse diameter four inches and a quarter. The linea pectinia forms here a very sharp spine, as sharp as a paper-folder. This was the cause of death, for in attempting to bring the head through the pelvis, the womb was forced against the ridge, and being pressed continually, gave way, so that part of the child escaped through the rent in the womb. As in the following specimen, the arm-bone is shaped by the action of the deltoid muscle. The muscles of the shoulder were very powerful, and she took great pride in the rapidity of her progress."

The skull is well shaped, with the bones somewhat irregularly thickened, although to a less degree than in the previous specimen. The spine and thorax, as well as the scapulæ and clavicles, show no marked change. The humeri are very irregular and short, with great development of the ridges, especially that of the deltoid, and marked prominence of the inner condyles. The bones of the fore-arm are small and somewhat bent forward, especially on the right side, with an exaggeration of most of the bony ridges, and an enlargement of the lower ends of the radii. The pelvis, as already noted, is markedly flattened and rickety. The lower limbs are crossed. The femora are short, and have an outward bend at the upper end. The great trochanters are above the level of the head. The lower ends are enlarged, and the linea aspera are unusually prominent. The tibiæ and fibulæ are in their crossed position, bent upon themselves, with the convexity directed forwards and outwards relatively to the trunk, but really forwards and inwards in the usual anatomical sense of the word. When the legs are much crossed the soles of the feet look downwards, the insides being, of course, to the outside. The tibiæ and fibulæ are, as usual, laterally flattened at the bend, considerable bone being thrown out in the concavity of the curve. The bones of the feet are soft and light. B. C. I. 3. M. 23.

6. 27. Skeleton affected by Rickets.—Skeleton of an adult woman, showing changes chiefly in the spine, pelvis, and lower limbs.

Thorax and spine show changes characteristic of lateral curvature, with convexity to the right in the mid-dorsal region. The bodies of the vertebræ are, as usual, rotated towards the convexity, and the right side of the chest is raised, carrying the scapula with it. In the concavity of the curve the bodies of the vertebræ are greatly compressed and fused together, the corresponding ribs being also compressed and anchylosed to the vertebræ, and their angles flattened. On the convex side

the angles of the ribs are as usual unduly prominent. The lumbar spine is comparatively unaltered. The pelvis is flattened from before backwards, and the lower end of the sacrum and coccyx project into the outlet.

Lower Limbs.—The bones of the right leg are longer and better developed than those of the left. The femora on both sides are curved forward near the upper end.

The tibiæ and fibulæ are bent forwards and inwards, this change being specially seen on the left side, where the shape of the fibula reminds one of an Australian boomerang, and has been firmly pressed against the tibia. There is a very marked projection on the outer side of the os calcis on either side. The bones of the upper limbs are not so much distorted as those of the lower. They show a certain degree, especially in the humeri, of the alteration noted in the previous skeleton, but the changes are much less than in the lower limbs. The right radius seems to have sustained a Colles' fracture.

B. C. 1. 3. M. 28.

6. 28. Skeleton affected by Rickets.—Skeleton of an adult woman—macerated, showing rickety changes in the lower limbs and pelvis.

There is a very slight lateral dorsal curve, not sufficient to have distinctly altered the thorax. The pelvis is somewhat flattened from before backwards. In the lower limbs the femora are curved forwards and outwards at the upper ends, and the linea aspera in each case is remarkably prominent. The tibiæ and fibulæ are bent inwards about the middle, with the usual ridges on the concavity. The bones of the feet show scarcely any alteration, except for the prominence of the tubercle on the outer side of the os calcis. B. C. 1. 3. M. 22.

6. 29. Distortion of the Sternum from Rickets.—Sternum and costal cartilages from an adult—macerated, to show the above.

The bone is much increased in breadth (3 inches in manubrium) but is stunted in length, and the angle of Luodivici is much increased. The body is twisted to the right and the manubrium to the left. B. C. I. 3. M. 29.

6. 30. Distortion of the Sternum from Rickets.—Sternum and parts of clavicles, costal cartilages, and anterior ends of true ribs, from a rickety person—partly macerated, to show the above.

The sternum is bent backwards, forming a projection in front opposite the second and third costal cartilages, and measures 3 inches at its greatest breadth, "while that of a very strong man 6 feet 2 inches in height, measures 1½ inches" (Sir Charles Bell).

The costal ends of the ribs are increased in breadth, but there are no remains of the bead-like enlargement seen in rickety children. From the complete ossification of the sternum and calcification of the cartilages, this has evidently been an old person. W. C. G. 34 A.

6. 31. Distortion of the Humerus from Rickets. — Left humerus from the same skeleton as 6.34, 6.35, and 6.50—macerated, to show the above.

The bone is stunted, and there is the same projection of the deltoid attachment, flattening of the head, and enlargement of the condyles which was noted in the description of the rickety skeleton, 6. 25. B. C. I. 3. M. 30.

6. 32. Distortion of the Upper Limb from Rickets.—Bones of the right arm and shoulder girdle—macerated, to show the above. The terminal phalanges of the fingers are wanting. (See also 6. 37.)

Excepting the bones of the hand, the others are all more or less stunted and distorted. The curves of the clavicle are increased, and the scapula is bent forward below the

spine. The humerus has an outward and forward curve at the insertion of the deltoid, and the internal condyle is unusually prominent. The radius and ulna are bent towards the ulnar side, having thus a curve with its convexity forwards and outwards. B. C. I. 3. M. 31.

6. 33. Distortion of the Upper Limb from Rickets.—Bones of the left arm and shoulder girdle—macerated, to show the above.

This specimen was taken from the same person as the foregoing, and shows changes similar in kind but varying in degree. B. C. I. 3. M. 32.

6. 34. Distortion of the Radius from Rickets.—Radii from the same case as that from which No. 6. 31 was taken.

The bones are bent forward about the middle, and there is a great hollow on the anterior surface, at the junction of the upper and middle thirds, caused by an undue prominence of the ridges on either side, and by the bending forward of the bone at this spot. The upper ends of the bone are rotated outwards, hence the bicipital tubercle looks directly forwards. The lower end of the bone is relatively enlarged, but the bones are otherwise stunted. B. C. I. 3. M. 30.

6. 35. Distortion of the Ulna from Rickets.—Left ulna (head wanting) from the same case as the preceding—macerated, showing the above.

The bone is stunted in length and thickness; the upper end is relatively enlarged, and is bent inwards from the rest of the shaft. The articular surfaces are diminished in size and altered in shape, as if movement at the elbow had been limited. B. C. I. 3. M. 30.

6. 36. Distortion of the Pelvis from Rickets.—Pelvis of a rickety person—macerated, to show the above.

The pelvis is flattened from before backwards, especially on the right side. This want of symmetry has probably been due to lateral curvature. The sacrum is straight at the upper part, and bends acutely forwards at the junction of its third and fourth pieces. "Interesting as connected with the operations of Midwifery." The bones are small, but ossification is complete.

B. C. 1. 3. M. 26.

6. 37. Distortion of the Lower Limb from Rickets.—Skeleton of the left leg of the same rickety person from whom the specimens 6. 32 and 6. 33 were taken—macerated, to show the above.

The bones are stunted in growth, bent, and relatively enlarged at the ankle and knee. The neck of the femur is bent so that the great trochanter is higher than the head. The shaft is curved, with the convexity of the bend directed forwards and outwards, and flattened as usual from side to side. The tibia and fibula towards their lower ends are markedly bent. The curvature is also directed forwards, and has, besides lateral flattening, a development of bone in the concavity of the arch. Relative to the lower end of the tibia, the foot is in the position of extreme flexion.

B. C. 1. 3. M. 34.

6. 38. Distortion of the Lower Limb from Rickets.—Skeleton of the right lower limb, from the same patient as the preceding —macerated, showing corresponding changes.

B. C. 1. 3. M. 33.

6. 39. Distortion of the Leg from Rickets.—Plaster cast of a right leg, showing the above.

The patient was a boy aged about 14 years.

The bones have been altered in a way quite similar to that seen in the preceding specimen. The bend has been about the same spot, and the altered shape of the bones is traceable through the covering of the soft parts. The foot was quite flat. The cast was taken when the sole was resting on the ground, to show this point. G. C. 3284.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 40. **Distortion of the Femur from Rickets.**—Right femur of an adult—macerated, to show the above.

The bone is stunted. The shaft is curved forward a little above the middle, and shows the usual lateral flattening at the curve, with increase of bone in the concavity. The inner condyle is unduly prominent downwards, and the person has probably therefore been knock-kneed. G. C. 1001.

6. 41. **Distortion of the Femur from Rickets.**—Section of the right femur of an old man—macerated, to show the above.

The bone is short and curved greatly forwards. The neck has sunk so as to relatively raise the trochanter. The section shows that at the bend the compact tissue is increased in front and even more so behind, and that the medullary cavity there is occupied by cancellous tissue. The femora were the only bones distorted in this case. G. C. 3085.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 42. **Distortion of the Femur from Rickets.**—Right femur of an adult—macerated, to show the above.

The bone is stunted and the shaft curved forwards about the middle, with a corresponding lateral flattening of the curve and development of bone at its concavity. The angle of the neck is obtuse, and the trochanter is raised relatively to the head. The inner condyle projects downwards, so that this also has probably been a case of knock-knee. B. C. 1. 3. M. 37.

6. 43. Distortion of the Femur from Rickets.—Left femur of an adult—macerated, to show the above.

The bone is slightly stunted, and has at its upper end a curve which projects outwards. There is the usual lateral flattening of the curve, with development of bone in its concavity. The inner condyle projects unduly downwards as if from knock-knee. B. C. I. 3. M. 35.

6. 44. Distortion of the Femur from Rickets.—Right femur of an adult—macerated, showing the above.

The shaft is stunted, and has a forward and outward curve at its upper part. The angle which the neck forms with the shaft is obtuse, and the head has been on the same level as the top of the great trochanter. The inner condyle projects downwards unduly as if from knock-knee. W. C. G. 23.

6. 45. Distortion of the Femur from Rickets.—Right femur of an adult—macerated, to show the above.

There is a somewhat S-shaped curve of the shaft. The projection is outwards and forwards above, and inwards below, with the usual lateral flattening at the point of curvature. The inner condyle projects markedly downwards as if from knock-knee. G. C. 361.

6. 46. Distortion of the Femur from Rickets.—Left femur —macerated, to show above.

There is a decided bend of the shaft directed inwards and forwards, and with the usual lateral flattening of the curve. The lower end of the bone is rotated outwards, and the inner condyle projects greatly downwards, as if from knock-knee. The bone is soft, probably owing to senile changes. G. C. 359.

6. 47. Distortion of the Femur from Rickets. Right femur —macerated, showing the above.

This is probably from the same patient as the last specimen. There is a decided bend of the shaft directed outwards, and laterally flattened upon the curve. The outer condyle is the more prominent downwards, and may have been associated with genu varum. Several irregular patches of new periosteal bone are seen about the middle and near the upper end. Not unlikely this is one of these cases where there has been a genu varum on the one side and a genu vulgum on the other. The condition of this bone is light and soft, like the previous one.

G. C. 360.

6. 48. Distortion of the Femur and Tibia from Rickets.— Oil painting of a femur and tibia illustrating the above.

The painting is from the bones of "Canny Elshie, the veritable Black Dwarf of Sir Walter Scott, obtained on loan from the Parish of Temple, where he was buried, and copied exactly in oils by P. D. H., in the year 1827 or 1828." (Note in Dr P. H. Handyside's handwriting on the back of the Painting.)

The following particulars as to the "Black Dwarf" are taken from Dr Craig's letter to Dr John Brown, which forms part of the article "The Black Dwarf's Bones," in the *Horæ Subsecivæ* (1882; second series, p. 344).

He was four feet high. . . . . "As near as I can learn, his forehead was very narrow and low, sloping upwards and backward, something of the hatchet shape; his eyes deep-set, small, and piercing; his nose straight, thin as the end of a cut of cheese, sharp at the point, nearly touching his fearfully projecting chin; and his mouth formed nearly a straight line; his shoulders rather high, but his body otherwise the size of ordinary men; his arms were remarkably strong. With very little aid he built a high garden wall, which still stands, many of the stones of huge size; these the shepherds laid to his directions. His legs beat all power of description; they were bent in every direction, so that Mungo Park, then a surgeon at Peebles, who was called to operate on him for strangulated hernia, said he could compare them to nothing but a pair of cork-screws; but the principal turn they took was from the knee outwards, so that he rested on his inner ankles, and the lower part of his tibias; . . . the *thrawn* twisted limbs

must have crossed each other at the knees, and looked more like roots than legs,

'An' his knotted knees play'd aye knoit between.'

"He had never a shoe on his feet; the parts on which he walked were rolled in rags, old stockings, etc., but the toes always bare, even in the most severe weather. His mode of progressing was as extraordinary as his shape. He carried a long pole, or 'kent,' like the alpenstock, tolerably polished, with a turned top on it, on which he rested, placed it before him, he then lifted one leg, something in the manner that the oar of a boat is worked, and then the other, next advanced his staff, and repeated the operation, by diligently doing which he was able to make not very slow progress.—He frequently walked to Peebles, four miles, and back again, in one day. His arms had no motion at the elbow-joints, but were active enough otherwise. He was not generally ill-tempered, but furious when roused. ROBERT CRAIG."

G. C. 3582.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 49. Distortion of the Tibia and Fibula from Rickets.—Tibia and fibula of the left leg of an adult—macerated, showing the above.

The bones have a bend, directed a little inwards and forwards, with the usual lateral flattening of the curve; best marked in the fibula. W. C. G. 33.

6. 50. Distortion of the Fibulæ from Rickets.—Right and left fibulæ, taken from the same subject as 6. 31—macerated, to show the above.

The bones are stunted and bent in a semicircle, and so flattened on the curve as to resemble a boomerang. B. C. 1. 3. M. 30.

6. 51. Distortion of the Fibula from Rickets.—Left fibula —macerated, to show the above.

The bone is curved abruptly inwards and forwards a little below the middle, and, as in previous specimens, is much flattened on the sides of the curve. F. P. C. 613.

Presented by Professor JOHN THOMSON.

(*b.*) *Osteo-Malacia.*

6. 52. Skeleton affected with Mollities Ossium.—Skeleton of an adult woman, described by Sir Charles Bell, as follows, viz. :—

"A skeleton of great value. In procuring this skeleton I lost myself for two hours, and found myself at two o'clock in the morning in the court before Pennycuick House.

"This skeleton differs from the others, being distorted by the disease called *mollities ossium*. In this woman the disease continued for many years. It was attended with incessant pain in the bones, and a deposition of the phosphate of lime from the urine; but what was most remarkable in the case, was the many children she had, with increasing difficulties in the labours, until at length the bones of the pelvis were so closed that it was necessary to perform the Cæsarean section upon her.

"She had a cross-birth, the belly of the child protruding. She had a child with a dangerous flooding. She had a child brought away by embryulcio and the crotchet. The disease proceeded, and the distortion of the pelvis increased. She became pregnant again, and it was necessary to bring the child away piecemeal. In this operation the surgeon seems to have conducted himself with great good sense, dexterity, and perseverance. His strength was exhausted by the exertion, so that for two days after the operation his hands and arms were benumbed. She suffered also in this painful operation, and was left for dead, and was long insensible, so that they were about to prepare her death-clothes.

"She recovered and became a seventh time pregnant. The surgeon who had previously attended her now refused to attempt the extraction of the child by the crotchet. The disease in the meantime had made progress, and the pelvis was much more distorted. When I examined her on the approach of labour, the womb hung forward, so that the integuments of the belly made a tumour like a great scrotal hernia betwixt the thighs. On examination per vaginam, the promontory of the sacrum presented in the middle of the passage, and only one finger could be passed through the pelvis, with which nothing could be felt. As for the child, it lay in a manner out of the pelvis. (For a full account of the case and operation, see the fourth volume of the Medico-Chirurgical Transactions.) The mother died, but the child lived, being the only one out of seven that was born alive.

"*Dissection.*—Two large masses of coagula lay in the belly. The cavity of the womb was filled with blood. Strings of coagula reached from the mouths of the sinuses of the womb to these coagula, as if the streaming blood had been arrested and coagulated while flowing. The uterus was not contracted and the edge of the incision into it was everted, as if paralytic, with the mouths of the vessels open upon it. She died of hæmorrhage.

"*Description of the Skeleton.*—The bones were all soft,

covered with their periosteum, which was not easily separated, and in endeavouring to separate it the knife went into the bone. She had lain in bed for the last two or three years, and therefore the spine, the thorax, and the pelvis are the parts most distorted. The arms and legs are those of a tall woman. From the occiput to the edge of the ilium is less than ten inches. The femur measures sixteen inches, yet on each side it is a little shortened by the neck being at right angles with the rest of the bone, so as to make the lesser trochanter almost touch the ilium. The lower vertebræ of the neck and upper vertebræ of the back protrude backwards almost at right angles, and the lower vertebræ of the back and loins make a great protrusion forwards. There is a remarkable indentation in the middle of the ribs on the right side, and those on the outer side are very much compressed and irregular. This was evidently caused by the muscles of respiration on the softened ribs.

"*Measurement of the Pelvis.*—That which at first appears as the projection of the sacrum is the bodies of the three lower lumbar vertebræ fallen forward so as to occupy the cavity of the pelvis. The sacrum has receded. From the promontory of the sacrum to that part of the brim of the pelvis opposite to the left acetabulum is something less than a quarter of an inch. From the right side of the promontory of the sacrum to the linea innominata is half an inch. The forefinger can here with difficulty be introduced between the bones; from the sacrum to the symphysis of the os pubis is two and a fifth inches. There is one part, and only one part of the brim, which admits a ball of an inch in diameter to rest in it. The ball will nowhere pass through. Where it lies it rests against these points—the fourth vertebræ of the loins, and the bodies of the two ossa pubes. The sacrum has suffered severely by her continually resting upon it. It is so bent that the base and angle of the bone approach within half an inch of each other. The outlet of the pelvis would also be considered remarkably distorted were not the attention fixed upon the unique distortion of the brim."

6.53. Osteo-malacian Pelvis.—Plaster cast of a pelvis, along with the lumbar vertebræ and upper ends of the femora, showing the above.

"Elizabeth Thomson, aged 32, was the mother of three children. Her first labour was natural, and the child born alive. She soon became affected with symptoms of malacosteon, and two years from this labour, required, in her second confinement, the use of the crotchet. In her third labour, which happened in June 1779, she submitted to the Cæsarean section, which was performed by Thomas Wood, Manchester. The child was alive, and the mother survived the operation seventy-six hours." (For the case see Mem. Medical Society of London, vol. v.)

The spine has been bent to the left, and the vertebræ are rotated in the usual way. The pelvis is compressed laterally in front, and the lumbar vertebræ project into its brim. The alæ of the ilium are crushed forward. The pubic arch is greatly compressed, and the lower piece of the sacrum and the coccyx are flattened towards the upper part of the sacrum. This is a good example of the "beaked" or osteo-malacian pelvis.

G. C. 1475.

Presented by T. Radford, Esq., *through* W. Campbell, F.R.C.S.E.

6. 54. Osteo-malacia of the Femur.—Portion of the lower end of the left femur of an adult—in spirit, showing the above.

James Stevenson, shoemaker, aged 33, enjoyed good health until about 1766, when he was seized with violent pains in the knees and feet. Severe headaches also came on at irregular periods. These pains were supposed to be rheumatic. He shortly afterwards injured his shoulder, and was unable to move it for several months. In November 1768 he slipped in his shop, and fancied that he had sprained his right thigh. He was unable to walk without the aid of a stick and a helping arm. In December of same year, when being helped upstairs, he struck the toe of his right foot upon the edge of the step, and cried out that his thigh was broken. He was confined to bed with great pain, and the leg remained much crooked and shortened. The condition was diagnosed to be fracture. After the use of splints for about five weeks, during which time the pain continued, an examination was made, and the tibia and femur, at the seat of fracture, gave way again, when the limb was being gently handled. The tibia was felt to be soft, and an incision was made over it. The bone was found to have about the consistency of a rind of cheese, and in the inside, Mr Thomson reports—"I found a dusky red or liver-coloured flesh, occupying the whole internal part of the bone, devoid of sensibility,

and from which the osseous covering had been removed without the least hæmorrhage; in short, it appeared to me an unorganised mass, similar to the flesh-like substance or coagulum which may be formed upon a stick or feather by stirring fresh blood in a basin."

The pains continued, and the right thigh and leg became more and more distorted, followed by a similar change in the left thigh and leg. His appetite remained good. His urine, for about two years, "deposited a whitish sediment, which, upon evaporation, became like mortar."

He became gradually weaker, and died on 18th February 1775.

At the post-mortem examination all the bones of the body were quite soft, and easily cut with a knife. "All these originally bony parts consisted of a mere cortical or outside osseous covering of the thickness of rind of cheese, and of an inside flesh-coloured mass." (See "Medical Observations and Enquiries by a Society of Physicians in London: Paper by Mr Henry Thomson; vol. v. p. 259.)

The greater part of the cancellous tissue is absorbed, and the outer shell is extremely thin and soft, and composed apparently, for the most part, of fibrous tissue. W. C. G. 36.

6.55. Osteo-malacia of the Lower Limbs.—Right lower limb—dried and in spirit, showing the above.

"From a young dwarf, affected with the mollities ossium."

The bones were quite soft, and the limb is bent so that the bones of thigh and leg form alternating curves. W. C. G. 35.

(*c.*) *Ostitis Deformans.*

6. 56. Ostitis Deformans of the Skeleton.—Photograph of the front view of a skeleton in the Museum of the Royal College of Surgeons, where the patient had been affected by this disease in most of the long bones and in the skull. (From the "Illustrated Medical News," February 23rd, 1889.) G. C. 3583.

6. 57. Ostitis Deformans of the Skeleton.—Photograph of a patient affected with ostitis deformans. (From the "Illustrated Medical News," February 23rd, 1889.) G. C. 3584.

6. 58. Ostitis Deformans of the Skull.—Portion of a cranium greatly thickened, possibly from a case of ostitis deformans. The three tables are transformed into cancellated tissue. Churchyard fragment. F. P. C. 627.

Presented by Professor JOHN THOMSON.

(*d.*) *Acromegaly.* Specimen wanted.

III. INFLAMMATORY CHANGES IN BONE.

1. *Changes in Bone due to Inflammation in the neighbouring soft parts.*

6. 59. Development of Bone under an Ulcer.—Sections of tibia and fibula—injected, and in spirit, showing the above.

The patient was a lad 18 years of age, suffering from paraplegia. His foot had been amputated, and a bandage applied too firmly in the after-dressing caused sloughing of the skin. While the resulting ulcer was in process of healing, secondary hemorrhage occurred, and necessitated a second amputation.

The tibia is markedly vascular at the posterior and outer parts. The fibula is more uniformly vascular. The vascular part of the tibia shows a crust of bone on the surface, while the compact layer is somewhat opened out. Similar changes are shown on the fibula, especially at its outer side.

G. C. 3170.

Presented by A. G. MILLER, F.R.C.S.E.

6. 60. Ulcer which caused Development of Bone under it.—Portion of the ulcer from the previous case—injected, and in spirit.

The specimen shows the vascularity of the ulcer and of the parts below. G. C. 3172.

Presented by A. G. MILLER, F.R.C.S.E.

6. 61. Bony Outgrowths on the Tibia and Fibula associated with Chronic Ulcer of the Leg.—Left tibia and fibula—macerated, showing the above.

The patient was a man aged 64. At the age of 42, the skin of his leg had been extensively burned at the upper and outer parts. The wound had healed, but the scar had broken down seven years before his admission to the Infirmary, and had formed a large ulcer on the upper and outer part of the leg. This ulcer had remained open, and latterly had become epitheliomatus at the upper part. The leg was amputated on account of the epithelioma.

Both bones, but especially the fibula, show considerable thickening and new periosteal formation. The surface of the fibula is covered with irregular stalactite processes, which to a certain extent follow the line of attachment of the interosseous membrane and of the inter-muscular septa; but there is also considerable thickening on the subcutaneous area above the outer malleolus.

The portions of the tibia most affected are the oblique and interosseous ridges, and the upper part of the extensor surface. At these places the surface of the bone is covered with irregular processes similar to those seen on the fibula. The articular surfaces of the knee and ankle are comparatively unaltered.

G. C. 3196.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 62. Chronic Ulcer of the Leg which caused the Bony Outgrowths in the foregoing Specimen.—Cast—in glue and glycerine—of the ulcer which was present before amputation in the previous case.

The irregular warty portion at the upper part is where the epithelioma had begun. The rest of the ulcer was covered with granulations, and the surrounding skin was cicatricial.

G. C. 3195.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 63. Bony Outgrowths on the Tibia and Fibula, asso-

ciated with Chronic Ulcer of the Leg.—Lower three-fourths of a left tibia and fibula—macerated, to show the above.

The patient, a middle-aged man, had suffered from ulcer of the leg for many years. Owing to the intractable character of the ulcer, the leg was amputated by Mr John Duncan.

The development of bone here also takes the form chiefly of irregular processes, following the inter-muscular septa. On the tibia there is, however, a considerable development on that part which lay beneath the ulcer, especially upon the front and on the outer surface, while smaller irregular patches can be seen at other places, even down to the inner malleolus. On the fibula the bony outgrowths are more prominent, the greater part, however, being toward the lower end of the bone. As in the previous case, the bony outgrowths are by no means limited to the part which lay immediately beneath the ulcer.

G. C. 3186.

Presented by JOHN DUNCAN, F.R.C.S.E.

6. 64. Chronic Ulcer of the Leg, which caused the Bony Outgrowths in the foregoing Specimen.—Cast—in glue and glycerine—after amputation of the leg from which the previous specimen was obtained.

The cast shows an unhealthy ulcer of the callous type, which had considerable induration and fibrous matting round it. The position of the ulcer should be compared with the outgrowths on the previous specimen. G. C. 3185.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 65. Bony Outgrowths on the Fibula, associated with Chronic Ulcer of the Leg.—Portion of a right fibula—macerated, to show the above.

Mrs H., aged 59 years, was admitted to Ward 17, Royal Infirmary, Edinburgh, on 19th February 1890. Twenty-six years before, while she was walking in snow, three weeks after the birth of her first child, her right leg suddenly became greatly swollen, the first sensation being a

prickly feeling in the thigh. She continued to go about, and several small but deep and painful sores appeared on her leg. These have since repeatedly healed and broken down.

When she was admitted there was a large ulcer on the outer side of the right leg, a little above the ankle-joint, "edges whitish, indurated, and everted." There was inflammation round the ulcer, also numerous cicatrices over the leg and a few varicose veins. There was intense pain, especially at night, round the ulcer and in the region of the ankle-joint.

As the ulcer resisted ordinary treatment, a piece of the fibula, one and a half inches long, was removed from just below the ulcer, to permit of contraction of the skin. The ulcer healed somewhat slowly, even with the assistance of skin grafts (human).

This piece of bone, like the previous specimen, is greatly thickened, and is irregular on the surface; so much so, that, were the history unknown, it would be impossible to recognise it as part of a human fibula. G. C. 3163.

Presented by A. G. MILLER, F.R.C.S.E.

6. 66. Alteration in the Bones of the Foot from Chronic Ulcer of the Leg.—Tarsus and metatarsus—macerated, to show the above.

Patient was a man of about 45 years of age, who had suffered from ulceration of the skin of leg and disease of the tibia for many years. His leg was amputated for epithelioma developing in the ulcer (see 6.465). The patient had not been aware of anything wrong with his foot, probably owing to the great trouble connected with the ulcer of the leg.

The bones of the foot were anchylosed by fibrous tissue. The articular surfaces are very irregular, and there are bony outgrowths on the surfaces of the astragalus and os calcis, and also to a less extent on the other bones. G. C. 2794. b.

Presented by JOHN DUNCAN, F.R.C.S.E.

The following Ten Specimens, of which there is no history, can easily be recognised as similar in character to Nos. 6. 61 *and* 6. 63, *of which the histories are known.*

6. 67. Bony Outgrowths on the Tibia and Fibula, associated with Chronic Ulcer of the Leg.—Left tibia and fibula—macerated, to show the above.

There is great periosteal development on the surface of both bones, especially at their lower ends. On the outer side of the lower end of the fibula the surface is porous, and has evidently formed part of the floor of an extensive ulcer. This surface presents a striking contrast to that of the other portions of both bones. At other places the character of the outgrowths and the condition of the surface is similar to that seen in Nos. 6. 61 and 6. 63. It should be noted that at the lower end of the fibula, besides the thickening of the bone and the porous character of the surface, there are at one or two places distinct depressions or erosions. It would appear, therefore, that the ulcer as it progressed and deepened had first induced the bony outgrowth, then opened out its surface, and finally had begun to attack it.

F. P. C. 433.

Presented by Professor JOHN THOMSON.

6. 68. Bony Outgrowths on the Tibia and Fibula, associated with Chronic Ulcer of the Leg.—Lower two-thirds of a left tibia and fibula—maccrated, to show the above.

The bones are anchylosed at their lower ends, and the changes are chiefly in the fibula. This bone, especially near its lower end, is greatly thickened, and its surface is covered by irregular foliacious masses. The tibia shows, about five inches from its lower end, a very marked node, with a portion projecting shelf-like towards the fibula. The surface of this node, as well as the surfaces of some of the irregular projections on the fibula at a lower level, are porous, and probably formed the base of an extensive ulcer. The rest of the tibia is comparatively free from bony outgrowth, except at the upper part of the outer surface, where irregular deposits are present.

B. C. 1. 6. M. 24.

6. 69. Bony Outgrowths on the Tibia, associated with Chronic Ulcer of the Leg.—Portion of a tibia—macerated, to show the above.

On the subcutaneous surface there is a sharply defined elevated node, the surface of which, as well as of some of the bone near it, is opened out and porous. At a little distance from the node there are some periosteal outgrowths which have a smooth surface. Probably an ulcer of the soft parts has been present over the porous surface. This specimen was formerly classified as a venereal node. B. C. I. 5. M. 15.

6. 70. Bony Outgrowths on the Tibia, associated with Chronic Ulcer of the Leg.—Section of a tibia, injected, and the soft parts, except the periosteum, cleaned off and dried, to show the above.

The surface of the bone is irregular, and has probably lain beneath an old-standing ulcer. The section shows that the compact tissue has been dense and even ivory-like in consistence.

W. C. G. 23A.

6. 71. Bony Outgrowth on the Tibia, associated with Chronic Ulcer of the Leg.—Portion of a left tibia—macerated, to show the above.

The bone is thickened on the surface, this being probably due to an ulcer of the soft parts over it.

B. C. I. 5. M. 77.

6. 72. Bony Outgrowths on the Tibia, associated with Chronic Ulcer of the Leg.—Upper end of a left tibia—macerated, to show the above.

The bone is very light. There is considerable periostitic outgrowth on the surface corresponding to the origin of the soleus muscle. This condition was probably due to an ulcer on the soft parts, lower down on the leg. B. C. II. M. 30.

6. 73. Bony Outgrowths on the Tibia and Fibula, associated

with Chronic Ulcer of the Leg.—Lower three-fourths of a left tibia and fibula—macerated, to show the above.

The bones are anchylosed near their lower ends. The changes are most marked in the fibula, which is greatly thickened towards its lower end, and shows a very irregular surface. The tibia is also enlarged towards its lower end, but to a less extent. From the point of anchylosis downwards, the axis of each bone inclines slightly forwards. Possibly, therefore, this has been a case of fracture, followed afterwards by ulceration of the soft parts, and consequent periostitic development on the surface.

B. C. 1. 5. M. 67.

6. 74. **Bony Outgrowths on the Fibula, associated with Chronic Ulcer of the Leg.**—Lower half of a left fibula—macerated, showing the above.

A portion of the outer surface about two inches from the lower end is depressed and porous, as if it had formed part of the floor of a deepening ulcer. On the remainder of the bone there are irregular outgrowths, similar to those seen in many of the previous specimens. B. C. 1. 5. M. 9.

6. 75. **Bony Outgrowths of the Fibula, associated with Chronic Ulcer of the Leg.**—Lower half of a right fibula—macerated, showing the above.

The surface of the bone is thick and irregular, and the antero-posterior diameter at the lower end is especially increased. The outer surface, a little above the malleolus, shows the porous, pitted character previously described as indicating the floor of a deepening ulcer. B. C. 1. 5. M. 82.

6. 76. **Bony Outgrowths on the Fibula, associated with Chronic Ulcer of the Leg.**—Upper end of a left fibula—macerated, to show the above.

The surface of the bone is covered with irregular projections, like those in No. 6. 63. and others.

W. C. G. 58.

6. 77. Development of Bone on Ribs from Chronic Empyema.—Portions of five ribs—macerated, to show the above.

T. W., a sailor, 26 years of age, was admitted to Ward 18, Royal Infirmary, Edinburgh, on 3rd April 1890. He had good health till 8½ months previously, when he had measles, followed by cold with rigors and pleurisy. "The left side of the chest swelled up." Breathing was very difficult, and the patient very weak. Three weeks later the pleura was incised, and three pints of what seems to have been pus evacuated. When he was admitted, there were several septic sinuses near the inferior angle of the scapula leading down to bare bone on the fourth, fifth, and sixth ribs, and communicating with the pleural cavity. Mr Cathcart removed portions of five ribs, and the patient made a good recovery.

The sections show the original outline of the ribs, with new bone on their inner surfaces. In some places the new bone is compact; in others it is cancellous, with a compact lining.

G. C. 3175.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

2. *Inflammation of Bone produced by mechanical or chemical irritation. Specimens wanted.*

3. *Inflammation of Bone produced by pus-forming organisms.*

A. Where the Organisms have reached the Bone through the Circulation.

a. Where important changes have not had time to develop.

6. 78. Acute Suppurative Periostitis of the Tibia—Right leg and portion of a foot—in spirit, showing the above.

Three weeks before admission to the Royal Infirmary, Edinburgh, the patient, a boy about 7 years of age, received a blow on the leg. This was followed by great pain, and drawing up of the leg, with sleeplessness and fever. In Professor Annandale's ward, the periosteum was freely

laid open, and a large quantity of pus, which had burrowed all round the bone, was evacuated. A counter opening behind was made for drainage. Three days afterwards violent hæmorrhage occurred from the soft tissues behind the bone, and was checked by plugging. As the boy's pulse and temperature continued high, the leg was amputated above the knee, one week after his admission. The knee-joint was found to be suppurating.

The specimen shows almost complete separation of the periosteum, except at the lower and slightly at the upper ends of the tibia. It also illustrates the very free incision required for such cases. The injection failed owing to the numerous points at which escape occurred. G. C. 2788.

Presented by Professor T. ANNANDALE, F.R.C.S.E.

6. 79. **Acute Suppurative Osteo-myelitis of the Tibia—Amputation.**—Section of the injected right tibia of a girl—in spirit, showing the above.

About Christmas 1889, Agnes R., aged 12 years, blistered a part of her heel, which soon became inflamed and irritable. This was poulticed and then improved. About the 8th of January 1890, her ankle "gave way" while she was skating, and became afterwards swollen and painful. The swelling, which was at first near the ankle, afterwards extended to the knee. Shortly afterwards an abscess was opened over the inner malleolus, and speedily others formed, and were opened higher up the leg. Eventually the ankle-joint communicated with one of the abscesses, and the tissues of the leg generally became inflamed. She was admitted to Ward 17, Royal Infirmary, on January 30th, 1890, and shortly afterwards the leg was amputated, just above the knee. A few days later an abscess formed on each shoulder, and that on the left was followed by considerable necrosis of the upper end of the humerus. Similar abscesses formed over each olecranon process. She was greatly emaciated, and after remaining in Hospital for many weeks, was sent to the Incurable Hospital, where she died some weeks afterwards.

The specimen shows purulent infiltration through nearly the whole of the medullary cavity of the tibia. It also shows new periosteal bone forming on the surface of the shaft, and complete detachment of the lower epiphysis. G. C. 3260.

Presented by A. G. MILLER, F.R.C.S.E., **1891.**

6. 80. **Acute Suppurative Osteo-myelitis of the Tibia—**

Amputation.—The outer half of the previous specimen, with the fibula—macerated, showing the above.

New bone is seen to have been developing on the surface of the shaft of both bones, but especially of the tibia. From the history of the case, it is evident that this new bone must have developed in about three weeks. There is no perceptible change in the bony texture of the medullary cavity.

G. C. 3261.

Presented by A. G. Miller, F.R.C.S.E.

6. 81. Acute Suppurative Osteo-myelitis of the Tibia—Amputation.—Water-colour drawing, by John T. Kelly, of Nos. 6.80 when fresh, to show the distribution of the pus in the medullary cavity. G. C. 3585.

b. Where the chief changes are in the form of rarefaction and absorption, *i.e.* a septic form of "Caries."

6. 82. Acute Suppurative Osteo-myelitis of the Neck of the Femur.—Section of the upper end of the right femur of a child, showing the effects of a recent case of the above.

The patient was a girl aged about eleven years, who had been brought up in the workhouse, and was delicate and ill-nourished. She developed symptoms of very acute synovitis of the hip, with great pain, following a slight injury. In a few days the pain subsided, and a large abscess formed round the hip, and projected at the back. It was opened and drained, but the child died suddenly next day, apparently from a clot in the heart. No post-mortem examination could be obtained.

The specimen shows that the bone has been opened out and softened on the front of the neck within the capsule. This accounts for the synovitis, which must have been suppurative. Had the child lived, necrosis of the part below the upper epiphysis might have followed. G. C. 3319.

Presented by Charles W. Cathcart, F.R.C.S.E., 1891.

6. 83. Acute Suppurative Inflammation in the Lower Epiphysis of the Femur (Acute Epiphysitis).—Outer half of the right knee of a boy aged four—injected, and in spirit, showing the effects of the above.

J. G. was admitted to Ward 18 on the 12th February 1890. He had a satisfactory family history and good previous health. About the beginning of January he had been suddenly seized with a severe pain in the right knee when asleep, and the leg became firmly flexed. This subsided, but was followed by frequent muscular spasms, producing complete flexion and great pain. These increased in severity, and became worse at night. A swelling then appeared in the region of the knee, and these attacks ceased.

On admission, he was very weak and thin. The limb was flexed, but could be straightened, and there was considerable swelling in the region of the knee, with pain and tenderness limited to the lower parts of the femur. The knee was treated by extension, afterwards by Scott's dressing and a plaster case. On removing these there were pains on the inner side over the epiphysis, and thickening of the synovial membrane. On the 11th March the painful spot was incised and pus escaped. No bare bone. *14th March.*—The temperature, pain, and swelling were worse, and the wound was "septic." *20th March.*—Explored and a necrosis of the femur diagnosed. Part of the epiphyseal cartilage was diseased. The joint was opened into and drained. *April* 1.—The patient has been going down-hill, suffering from septicæmia, so Mr Cathcart amputated through the thigh. The patient recovered.

The softening and destruction of the epiphysis and adjacent portion of the shaft is distinct. An abscess had started to burrow up into the popliteal space. G. C. 3179.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 84. Acute Suppurative Inflammation of the Lower End of the Femur, with Erosion and Rarefaction.—Lower end of the shaft of a right femur (epiphysis wanting) —macerated, showing the above.

"The patient, G. Y., aged 16, stated that, seven weeks ago, while walking, he was tripped, and his knee came in contact with a small stone. This caused no visible injury. He continued walking for two days after, when his knee swelled and became extremely painful. These symptoms, accompanied with much febrile irritation, continued for a month, during which time leeches and cold applications were first employed, and afterwards poultices and fomentations. Three weeks ago an

abscess was discharged at that point where the cicatrix now remains, and about a pint of pus escaped. From this opening matter continued to flow in large quantities, till Monday last, when it had healed. His state of health had been gradually getting worse.

"The knee, especially on its anterior part, is much swollen, and its surface somewhat red and exquisitely painful. The patella is anchylosed. In the cavity of the joint there is a collection of fluid, affording a very distinct sense of fluctuation. The knee is preserved in a semi-bent position, and its motions are altogether lost. At its upper and inner part there is a small cicatrix. The inferior part of the thigh is also swollen, and the foot frequently œdematous. Several glands in the right groin are enlarged and painful on pressure. His general health is much impaired. There is much emaciation and debility—pulse 125, small—appetite bad—frequent night sweats—tongue clean—bowels slow.

"On examination, Dr Hunter found that the femur was enlarged and diseased about three inches below the trochanter major. On 25th inst. he slept some—pulse 132, small—some sweating during night—tongue clean—some thirst. The cicatrix was opened up to-day, and about ten ounces of sero-purulent matter was discharged from the course (*sic*) of the femur.

"After admission the patient showed symptoms of septic poisoning. There was a very extensive discharge, and as he was getting weaker, it was thought better to amputate below the small trochanter, from which he made a good recovery."

The lower half of the specimen is very irregular, showing small patches of necrosed bone, with depressions and erosions round about them and numerous holes. There is also some deposit of new periosteal bone in the neighbourhood.

This seems to have been a case of advancing septic inflammation in the bone. G. C. 1004.

Presented by Adam Hunter, F.R.C.S.E.

6. 85. Acute Suppurative Inflammation of the Upper End of the Femur, with Rarefaction and Loss of Substance.—Upper half of a right femur, probably that of a woman—macerated, showing the above.

The interior of the head has, in many places, disappeared, and the back and under surfaces of the neck are irregularly and extensively opened out and absorbed, some of the bone on the interior seeming to be necrotic. The bone below the small

trochanter has been reduced to a thin shell, existing only on the outer side. This has been fractured, possibly in the process of preparation. Below the seat of fracture some new periosteal bone has been thrown out on the surface. This has evidently been a case of advancing septic inflammation.

B. C. 2. M. 4.

6. 86. Acute Suppurative Inflammation of the Cranium.—Lower half of a cranium, lower jaw and first three cervical vertebræ—macerated, showing the above.

The patient, an old lady aged 75 years, had suffered from a most severe attack of erysipelas of the face and head, accompanied by very great œdema and swelling of the soft parts, and followed by their destruction. Caries soon occurred on the mastoid process, and rapidly spread to the neighbouring bone. Ere long the carotid artery was laid bare, and was seen pulsating against a sharp portion of the petrous portion of the temporal bone. It ruptured in a day or two, and fearful hæmorrhage occurred. Dr Foulis at once stuffed up the large hole which had been formed in the side of the head by the destruction of the soft parts and bone with a lump of cotton wadding. This stopped the bleeding, and the lady lived for four days afterwards.

The squamous and mastoid portions of the temporal bone, with the great wing and outer ptergyoid plate of the sphenoid as well as the condyle of the lower jaw, have disappeared. The surfaces of bone which lay next to the missing parts are rarefied and absorbed. The vertebræ have evidently been injured in being removed, but parts of their surface have also been attacked by the disease.

G. C. 2647.

Presented by James Foulis, M.D.

6. 87. Acute Suppurative Inflammation of the Sternum leading to Destruction.—Lower end of a sternum and costal cartilages, showing the above.

The specimen was obtained from a patient who died in the Royal Infirmary, Edinburgh, in 1824, after a head injury, for which trephining had been performed. The cause of death was therefore probably pyæmia, in the course of which an abscess had formed in the sternum.

The lower part of the bone, especially on the left side, has disappeared, and the surface round the missing part has been opened out and eroded. G. C. 596.

c. Where the chief changes are in the form of enlargement.

6. 88. Thickening of the Femur from Chronic Suppurative Inflammation of the Compact Tissue.—Left femur—macerated, to show the above.

A portion of the new shell has been removed, to expose the condition of the original surface.

The periosteal crust is about a quarter of an inch thick, while the original compact tissue is opened out and partly absorbed. This, therefore, seems to have been the seat of the disease, which, by its irritation, has led to the development of new bone from the periosteum. B. C. 1. 5. M. 23.

6. 89. Thickening of the Femur from Suppurative Inflammation of the Compact Tissue.—Anterior half of the upper end of a left femur—macerated, showing the above.

The specimen is from the body of a man about 34 years of age. He had complained for nearly eight months of acute pain in that thigh, which gradually swelled, and eventually was opened, and discharged a large quantity of pus.

The medullary cavity is partially filled up by newly-formed cancellous tissue. Opposite this place, on the outer side, the compact tissue has been opened out. On the surface much new bone has been formed, so as to produce a considerable thickening, which gradually fades off into a thin periosteal crust upon the other parts of the shaft. The section has passed through a depression on this enlargement. In this case, therefore, the suppurative inflammation has found an exit opposite the centre of the new mass, and has not caused either necrosis or bone abscess. G. C. 1636.

Presented by J. Newbigging, F.R.C.S.E.

6. 90. Thickening of the Femur from Chronic Suppurative Ostitis.—Right femur—macerated, showing the above.

The bone is much curved forwards near its lower end, and is correspondingly flattened from side to side. The posterior aspect of the bone is very rough and irregular, but the surface elsewhere is smooth, except where there are impressions left by blood-vessels. This seems to have been a case where chronic ostitis had led to softening and yielding of the bone, with subsequent solidification. W. C. G. 34.

6. 91. Great Thickening and Irregularity of the Surface of the Femur, from Chronic Suppurative Osteo-myelitis.—Right femur, in section, showing the above.

There is great thickening of the bone and extraordinary irregularity of its surface. Along the back, and on all aspects of the upper third, the surface is thrown out into large irregular processes and plates, a condition which is also seen, to a less extent, along the front. The medullary cavity is completely filled up by cancellated tissue, except for about an inch near the upper end. At the junction of the upper and middle thirds the new bone shows several irregular cavities communicating posterially with the surface. These have probably been due to localised suppuration or minute necroses. One or two similar cavities are seen scattered throughout the bones. G. C. 1000.

6. 92. Great Thickening of the Femur from Chronic Suppurative Osteo-myelitis.—Right femur in section—macerated, showing the above.

There is very great enlargement of the shaft of the bone, with some dilatation of the medullary cavity near the lower end. The surface of the bone along the back and at the muscular attachments of the trochanters is irregular, and the vascular channels are greatly enlarged all over. The wall of the shaft is almost entirely composed of cancellated tissue.

B. C. 1. 5. M. 26.

6. 93. Thickening of the Surface of the Tibia with Absorption of the Interior, probably from Chronic Suppurative Osteo-myelitis.—Lower end of a right tibia —macerated, showing the above.

There has been a considerable crust of new periosteal bone on the surface, which has been, however, partly broken off. The original surface of the bone is porous, and at places has been opened into small holes. G. C. 1147.

Presented by Professor JAMES RUSSELL.

d. Where the changes in the bone tissue have resulted in an abscess.

6. 94. Abscess in the Lower End of the Radius.—Lower end of a left radius—macerated, showing the above.

Above the articular surface there is considerable enlargement and hollowing out of the interior, probably due to chronic suppuration. Three cloacal apertures communicate with the inside, and through them pieces of rarefied and apparently necrotic bone can be seen. The surface has the irregular character of newly-formed bone when due to the irritation of suppurative organisms. B. C. I. 5. M. 14.

6. 95. Abscess in the Lower End of the Femur.—Left femur —macerated, to show the above.

The lower half of the bone is greatly enlarged by new and irregular formation on the surface. The interior is hollowed out, and formerly contained fragments of necrosed bone. This has evidently been a case of suppuration within the lower end of the bone, causing osseous development on the outside. W. C. G. 29.

6. 96. Abcess in the Lower End of the Tibia.—Section of a left tibia with fibula, showing the above.

The lower end of the tibia is much enlarged, and there is a cavity in the interior extending half-way up the bone, but partially interrupted by cancellous tissue. The enlarged part of the bone has been trephined, and the upper end of the cavity has been reached, but drainage has evidently been incomplete, for the lower portion of the cavity communicates by only a narrow aperture with the trephine hole, and is enlarged. The periosteal thickening of the tibia corresponds to the cavity inside. The fibula is enlarged about its middle, and especially on the inner aspect. G. C. 3212.

Presented by A. G. MILLER, F.R.C.S.E.

6. 97. Abscess in the Lower End of the Tibia.—Left tibia, in section, and fibula—macerated, showing the above.

The surface of the tibia on the lower two-thirds shows considerable alteration. A large node-like swelling is seen in front, about the middle. Below this there is a considerable deficiency, with an aperture leading from it into a cavity situated above the lower articular surface. The walls of the cavity are lined by cancellated tissue, with only slight thickening round the sides. The bone tissue however, above and below the cavity, is condensed. The upper end of the bone seems normal. The fibula is thickened near the affected part of the tibia. The appearances are not typical of an ordinary bone abscess, and the condition *may* have been tubercular.

F. P. C. 423.

6. 98. Abscesses and Chronic Ostitis in the Tibia.—Lower two-thirds of a fibula, and section of tibia—macerated, to show the above.

"Twenty-six years ago the patient, T. S., a man aged 39, was affected apparently with necrosis of the tibia, which bone is evidently much enlarged. Nine years ago he was first attacked with his present complaints, from which he recovered completely in five months, and continued perfectly well until within six months of the present date, when he again relapsed, after exposure to cold and wet.

"A little in front of the right malleolus externus there is the orifice of a sinus which runs underneath the extensor tendons, and terminates by another opening a little below the inner malleolus. From both of these orifices the probe may be passed into the articulation of the astragalus and tibia, the articulating surfaces of which bones are felt rough; discharge copious but healthy; the motions of the joint are very confined, and the surrounding parts much swelled and slightly inflamed. General health pretty good; pulse 100; tongue a little furred; slight sweating; bowels rather costive.'

The leg was amputated by the single flap operation two or three days after his admission, and he made a good recovery.

When fresh, "the tibia was dry, of a deadly whiteness, and not a particle of blood or of marrow oozing from its cut surface."

"The tibia appears to have been the seat of long-standing and inveterate disease. This bone is enlarged throughout its whole length, but more particularly at its extremities, and on laying it open by a longitudinal section you observe its whole medullary cavity occupied by osseous depositions. This internal structure has been in several places the seat of caries, or, perhaps, I should rather say, of internal abscesses. A small one is observable just at the point where the bone was cut across in removing the limb, another immediately below this point, a third towards the middle of the bone, and a fourth very large cavity is situated in the distal extremity of the tibia immediately above its junction with the astragalus. This cavity, in the recent state, contained a quantity of purulent matter. It opens in front by a circular aperture immediately over the ankle joint, and it was, I suspect, into this opening that the probe passed when I conceived it to be going into the cavity of the joint. On the posterior surface of the bone, nearly opposite to the seat of this abscess, you will find some adventitious deposition of ossific matter in a stalactitic form. The fibula scarcely presents anything worthy of notice. Its lower extremity is divested of its articular cartilage, and apparently roughened, but whether this is the effect of disease or maceration is not very easily determined." (Sir George Ballingall's Clinical Lectures, No. 4, p. 18.)

The pockets on the wall of the lowest abscess cavity in the tibia resemble somewhat the results of tubercular invasion, but

the history of the case seems to point sufficiently clearly to the agency of pus-forming organisms. G. C. 1119.

Presented by Sir GEORGE BALLINGALL.

6. 99. Disease of the Astragalus and Fatty Degeneration of the other Tarsal Bones, secondary to the above Condition of the Tibia.—Bones of the right foot from the same patient as the last specimen—macerated, to show the above.

"The whole bones of the foot, although not showing much disease, were so extremely soft and pulpy as scarcely to admit of articulation. They could have been cut across in all directions with a common scalpel without turning its edge."

The articular surface of the astragalus seems to have been affected more from the anchylosis than from the actual disease. Some of the roughness on it may have been caused in process of preparation. G. C. 1119.

Presented by Sir GEORGE BALLINGALL.

6. 100. Abscess and Chronic Ostitis in the Lower End of the Tibia.—Lower part of a right tibia in section—macerated, illustrating the above.

The bone is greatly thickened, owing to new formation of cancellated tissue. The large cavity at the upper part is continuous with the medullary canal. A small cavity seen below on the front section has its walls formed of condensed bone. This condition has apparently been the result of chronic septic osteo-myelitis in the lower end of the bone, ending in suppuration in one or two places. W. C. G. 14.

6. 101. Enormous Enlargement of the Upper End of the Tibia, from Abscesses in the Interior.—Section of a

right tibia, with fibula attached—macerated, showing the above.

"Charles Anderson, æt. 31. In summer 1814, while on a voyage to the Baltic, he fell on deck with his leg under him. This fall was followed by great swelling below the knee and inability to use the limb. On getting into Riga, ten days after, he was carried to a surgeon, who considered the injury as slight, and gave him a liniment to rub with. He continued this for about a week, and got a little better, so as to be able to walk on crutches—though not to put his foot to the ground—when he had a second fall in crossing the street. He was now carried to a Hospital in Riga, where he was told that the bones below the knee were splintered into several pieces, and was confined to bed for six weeks. He then left the Hospital and came home, still quite unable to walk, and the swelling as great as ever. In winter 1815-16 he was in the Edinburgh Infirmary for about a fortnight, when amputation was proposed, but to this he would not consent. In spring 1817, the swelling, which at this time appears to have been only partially ossified, was cut into by a surgeon in Dundee, and discharged a little bloody pus, but soon healed up. In winter 1817-18 he had a severe fever, during which an opening formed where the incision had been made. After his recovery from the fever, he felt the limb much stronger than it had ever been since the accident, and was soon able to walk. Since then the sore has continued open, discharging commonly a bloody serum, sometimes mixed with blood and purulent matter, and at different times portions of splintered bone, which, he says, could be seen, for months before being discharged, imbedded in the osseous walls of the cavity. The discharge at first was not great, but has gradually increased to eight, twelve, and sometimes even sixteen ounces in twenty-four hours. When he began to walk, he was obliged to use a plug of wood and tow, at first small, but gradually enlarged as the aperture increased to its present size. This he removed once or twice a day, and discharged the fluid from the cavity, which was then washed out, and filled with tow or sponge. His health for the last twelve years had been good, till within six or eight months of this time, when hectic symptoms began to appear, with increased discharge and pain after unusual exertion or exposure to cold. Since 1820 he has been employed as clerk to a manufacturer, when he often had occasion to exert himself considerably in weighing flax, and was able to use the diseased limb nearly as well as the other, and has sometimes walked upwards of twenty-four miles in one day."

Note by Dr R. Knox.—"On examining the limb . . . the following appearances were noted: an extensive swelling or tumour occupying the superior third of the leg, and extending from close to the knee-joint downwards. This tumour seemed to be composed of an osseous sheet, formed apparently at the expense of the tibia, as the fibula could be traced from

below upwards, apparently unconnected with it. The integuments were everywhere sound. On the anterior and somewhat inner aspect of the limb a circular opening, rather more than an inch in diameter, led into the interior of the bony case. The integuments passed into the opening for a short way, passing insensibly into a soft mucous-looking membrane lining the whole interior of the osseous case, and seemingly occupying the centre of the tibia. These facts were observed before any dissection, on merely removing the plug mentioned in the case above, which the patient used to insert and withdraw at pleasure, so as to allow of the escape of matter and the washing out of the cavity. On dissecting the limb, these conjectures, as far as they regarded the nature of the tumour, were found to be correct. A section of the tibia in its long axis showed the upper part of the tibia dilated into an enormous cavity, capacious enough to contain sixteen and a half ounces of fluid, lined throughout by the membrane already spoken of, and communicating externally by means of the aperture, which the patient was in the habit of plugging up. The lower portion of the tibia was quite sound, and scarcely, if at all, altered from its natural appearance. The medullary cavity of this sound portion did not communicate with the diseased cavity above, nor do the walls of the cavity itself present any very remarkable or diseased appearance, and they are of considerable thickness. Of the surrounding soft parts—muscles, nerves, arteries, etc.—it may be said that they were perfectly healthy. The muscles which ran over the tumour were put greatly on the stretch, but in all respects quite healthy. Indeed, the change affecting the tibia was limited entirely to itself, nor did the periosteum covering it show any diseased appearance or change of structure."

The following points may be noted on this macerated portion. The inner wall of the cavity presents a surface formed of opened-out, carious-looking bone, showing at some places necrotic and almost loose portions, and at others irregular pockets, probably resulting from the separation of necrosed fragments. The wall of the cavity, which varies from one-

quarter inch to one inch and a quarter in thickness, is chiefly formed of porous bone, but it is more condensed externally, and is densely compact where it joins the shaft. At the upper end the wall itself has been the seat of one or two small abscesses. The outer surface of the expanded portion and of the shaft below is thrown into the irregular plates characteristic of chronic periosteal irritation. The fibula has a few bony spicules upon its inner surface, but it is chiefly remarkable in having been gradually flattened out, and bent so as to fit on to the adjacent surface of the expanded tibia.

The cavity has evidently been formed by new growth on the outer surface, with absorption from within. G. C. 1219.

Presented by Professor JAMES RUSSELL.

6. 102. Enormous Enlargement of the Upper End of the Tibia from an Abscess in the Interior.—The other half of the foregoing specimen—in spirit, illustrating the above.

This specimen shows the abscess cavity lined with granulations, also the plug of wood and tow alluded to in the history of the case, as when the patient wore it. G. C. 1218.

Presented by Professor JAMES RUSSELL.

6. 102a. Oil painting of the preceding preparations in their recent state. F. P. C. 15. a.

c. Where the chief changes are in the form of necrosis or death of a palpable portion.

(*a.*) *Where the dead piece has been in process of separation.*

6. 103. Acute Suppurative Osteo-myelitis and Periostitis of the Tibia—Necrosis.—Portion of the tibia of a boy, with adjacent soft parts—injected and in spirit, to illustrate the above.

The patient, a boy aged 12 years, had suffered from an inflammation considered to be erysipelatous, following exposure to cold. "In conse-

quence of sinking from hectic fever, amputation was performed, but he died two weeks after."

The specimen shows an area of bare dead bone, with a great thickening and vascularity of the periosteum on what had been living. The dead bone has been pitted on the surface by the vascular granulations, which have been lifted up in many places to show this. Other vascular granulations can be seen here and there coming through the bone from below. At one place there is a narrow grey strip of new periosteal bone.

This has evidently not been a case of erysipelas, but of the above, a disease often mistaken for it. These cases often die, as this one probably did, of septic poisoning, with or without pyæmic complications. G. C. 2228.

Presented by ALEXANDER WATSON, F.R.C.S.E., February 1837.

6. 104. Acute Suppurative Osteo-myelitis and Periostitis of the Tibia—Necrosis.—Tibia of a young person, with adjacent soft parts—mounted in spirit, to illustrate the above.

The entire shaft has apparently been involved. This specimen resembles the last in the death of portions of the shaft, thickening of the periosteum at other places, and in pitting and erosion of the dead parts by the granulations of the living. G. C. 3352.

6. 105. Acute Suppurative Osteo-myelitis and Periostitis of the Tibia—Necrosis.—Section of the upper half of a tibia—injected and mounted in spirit, to illustrate the process of separation of necrosed fragments.

The disease was started by a blow upon the tibia. "Mr Benjamin Brodie took notes of this case, when the patient was in Hospital (Middlesex) 1806."

There is a large piece of necrosed bone in front, and other smaller pieces below and behind. The dead parts are indicated by bristles and are whiter than the rest. The process of

separation may be specially studied on the large fragment in front. There the vascular granulations which have separated it from the living stand out as a deep red line all round and below it. A similar process may be observed, only less distinctly, in connection with the other smaller fragments marked by bristles. The periosteum has formed a crust of new bone around the original shaft, except opposite the large necrosed fragment, where it has probably been itself destroyed.

W. C. G. 25.

6. 106. Acute Suppurative Osteo-myelitis and Periostitis of the Tibia—Necrosis.—Section of the lower half of the same tibia as the last—injected and mounted in spirit to illustrate the above.

Some of the original cancellated tissue is seen in the interior. Outside this, and marked by bristles, there are necrosed portions of the original compact tissue, and beyond that again there is a thick layer of newly formed periosteal bone. This is irregular on the surface, and shows at one place a cloacal aperture for the escape of pus from the neighbourhood of the dead bone.

W. C. G. 24.

6. 107. Acute Suppurative Osteo-myelitis and Periostitis of the Tibia—Necrosis.—Wax cast of a leg, illustrating the above.

This cast was figured in Russell on "Necrosis," published in 1794, plate v. fig. 1. The wax was apparently not changed at all as yet (1893). G. C. 1177.

Presented by Professor JAMES RUSSELL.

6. 108. Acute Suppurative Osteo-myelitis of the Tibia and Femur—Necrosis.—Plaster cast of the inside of the thigh and leg of a young person, showing the above.

There has been considerable swelling in the region of both femur and tibia, with several granulating points, which have been the outlet of sinuses communicating through cloacæ with the dead bone. F. P. C. 2878.

6. 109. **Acute Suppurative Osteo-myelitis of the Tibia—Necrosis.**—Plaster cast of the left leg and foot of a young person, illustrating the above.

There has been a necrosed fragment lying exposed on a large ulcer in front of the tibia and surrounded by granulations as in the previous case. The limb has been swollen.

F. P. C. 2876.

6. 110. **Acute Suppurative Osteo-myelitis of the Tibia—Necrosis.**—Plaster cast of part of the left leg and foot of a child, illustrating the above.

The knee has been acutely flexed and the foot extended. Both leg and foot have been swollen, and the dead bone has been not only exposed and surrounded by granulations as in the previous case, but its upper end has been partly extruded.

F. P. C. 2879.

6. 111. **Acute Suppurative Osteo-myelitis of the Tibia—Necrosis.**—Plaster cast of the front of a leg, in which, as in the previous case, a portion of dead bone has been partly extruded from the tibia and surrounded by granulations.

F. P. C. 2881.

6. 112. **Acute Suppurative Osteo-myelitis of the Radius—Necrosis.**—Lower end of a right humerus, with the radius

and ulna—muscles partly cleaned off and in spirit to show the above.

W. B., a weaver, aged 21, was admitted to the Royal Infirmary, Edinburgh, on 21st May 1824. Fifteen weeks previously the disease began with erysipelas of the part, followed by formation of abscesses in different parts, and of sinuses similar to that now at bend of arm. Some of these have never healed, and he has had two subsequent attacks of erysipelas. Was in the House from March 23rd to April 16th. Dismissed by desire."

On his second admission, "the whole of the right fore-arm is swelled and particularly tender, especially at the elbow and wrist, where the enlargement is equable and very hard, and where there are sinous openings leading down to the bone. The granulations at the mouths of these are prominent, and there is a fungus forming over the carpus a large irregular unhealthy ulcer. The joints appear anchylosed ; motions of the hand, which is distorted inwards, lost. The attempt to move the hand in any direction attended with great pain. Great general weakness and copious sweating. Pulse 102, firm ; tongue clean ; bowels costive ; appetite pretty good."

The arm was amputated by Mr Allan at about two inches above the elbow. The patient did well for three days after the operation, but on the evening of the third day he had severe rigors, followed by profuse sweating and other symptoms of pyæmia, which continued till his death. The stump suppurated extensively. The pus ran up to the shoulder and affected the joint. Patient sank exhausted on the 16th July. (See No. 6.181.)

The radius is enlarged over its whole extent by development of new bone on the surface. At the back, near the lower end, there is a large fragment of dead bone, which is free above, but surrounded by a new shell below. The ulna does not appear to have been involved by the disease. G. C. 981.

6. 113. Acute Suppurative Osteo-myelitis of the Femur—Necrosis and Rarefaction.—Left femur—macerated, showing the above.

"The man received a blow from a mallet on the thigh. A deep and large abscess formed. He died. An abscess surrounded the thigh-bone, which broke when being raised."

On the posterior portion of the lower end of the shaft there is a large necrosis, smooth and white, and partially separated from the surrounding bone. The groove of separation is much deeper above than below, where at places it is very indefinite.

Another smooth necrosed patch is seen in front of the small trochanter, and is evidently portion of a large and deep necrosis. Before the fracture this has apparently been continuous with the lower necrosed piece. Some new bone has been thrown out on the front of the shaft, and also behind for a few inches below the seat of fracture. The cancellated tissue at the upper and lower ends of the bone, especially near the necrosed portion, has been rarefied, and is a good illustration of what has been already noted as septic caries. (See Nos. 6.82 to 6.87.)

B. C. 1. 1. M. 24.

6. 114. Acute Suppurative Osteo-myelitis of the Femur. —Left femur of a young person—soft parts cleaned off and in spirit, to show the above.

There is a fracture about the middle of the bone, which may have been a compound one, and therefore possibly the starting-point of the disease. A large portion of the whole thickness of the shaft below the fracture is smooth, and evidently has necrosed. It has been in process of separation from the bone below. Above the fracture, for some distance, there has been some periosteal new growth. Just below the level of the small trochanter the bone has been entirely destroyed. Loose fragments of necrosed bone are seen here and there at the upper end of the shaft. The substance of the bone above this point has been softened and partially absorbed, and has been separated into distinct pieces, some evidently necrotic. The whole bone, with the exception of the lower epiphysis, seems to have been affected.

This specimen, like the last, illustrates what might be called septic caries and septic necrosis.

If it were certain that the disease in this case had resulted from a compound fracture, this specimen would have been placed in group B, *i.e.* among those in which pus-forming organisms have attacked the bones through wounds.

G. C. 3353.

(*b.*) *Where the dead piece has become loose, but has remained in position, and has acted as a source of irritation.*

6. 115. Acute Suppurative Osteo-myelitis of the Femur—Necrosis, Fracture.—Lower half of the right femur of a lad, aged 18—macerated, to show the above.

Three years before amputation a large abscess formed in the patient's right thigh. This was opened, but had continued to discharge for six months, when he fell and fractured the affected femur. Union took place, but at an obtuse angle, and the previous discharge of matter continued. A probe when passed into the opening came in contact with bone, but no loose portion could be discovered previous to the amputation. This difficulty was afterwards explained when it was found that the sequestrum had been covered posteriorly by a mass of semi-cartilaginous substance fully an inch in depth, which occupied the popliteal space, and was distinctly continuous with the thickened periosteum.

At the back of the preparation there is a large sequestrum, loose, but partially surrounded by the neighbouring new shell. The lower end of the shaft, which is for the most part of new formation, is curved forwards just in front of the sequestrum. The latter has evidently been pressing against the bone above and below the bend, and thus must have acted mechanically in preventing the bend from increasing. The surface of the new shell blends with the original bone at the knee and towards the middle of the shaft. G. C. 2111.

Presented by Benjamin Bell, F.R.C.S.E., **1840.**

6. 116. Acute Suppurative Osteo-myelitis of the Femur—Necrosis, Anchylosis of the Knee, and Atrophy of the Tibia.—Section of the lower end of a femur and upper end of a tibia—macerated, to show the above.

The patient, a young person, suffered about two years before amputation from acute suppuration and inflammation of the femur, which ended in necrosis. He had not been treated, and had lain with his knee very much flexed. Amputation was performed through the thigh by Professor Annandale.

The specimen shows a sequestrum in the femur, lying now loose in a cavity, with considerable development of new bone near and partially surrounding it. The new bone towards the

knee becomes very delicate, and at the knee there is practically no bone at all. The bone forming the upper end of the tibia is reduced to a shell with numerous apertures in it. The shaft of the tibia is also reduced to a hollow and fragile shell, which in many places is perforated by apertures. The contrast between the atrophy of the tibia and the new bone development round the sequestrum in the femur is very striking. G. C. 3499.

Presented by ALEXIS THOMSON, F.R.C.S.E., **1893**.

6. 117. Acute Suppurative Osteo-myelitis of the Femur—Necrosis, Anchylosis of the Knee, and Atrophy of the Tibia.—Water-colour drawing by John T. Kelly of the previous specimen, when fresh.

The drawing shows the enlargement of the femur, and the sequestrum lying in its cavity surrounded by grey gelatinous material. Near the lower end of the shaft of the femur the new bone is shown opened out in texture and the epiphysis and adjacent part of the shaft entirely occupied by a brown fatty material. The same substance is seen in the section of the patella and tibia. The cancellated tissue in the tibia is entirely absorbed and the bony shell is very thin. The muscles round the bone were very soft and fatty. G. C. 3500.

6. 118. Acute Suppurative Osteo-myelitis of the Femur—Necrosis, Amputation.—Sequestrum of the lower portion of a femur, partially surrounded by a shell of new bone—macerated, to show the above.

The disease began in the knee-joint. A partial case of new bone has formed round it. The surgeon in charge of this patient wished to amputate at the hip-joint, but on Sir Charles Bell's advice, he amputated through the thigh, with complete success.

The sequestrum, which has included the greater part of the lower end of the shaft, has been completely separated

from the adjacent bone. The new shell has been too imperfect to have been functionally useful. B. C. 1. 5. M. 41.

See Sir Charles Bell on "Spine and Thigh Bone," plate v. fig. 2.

6. 119. Acute Suppurative Osteo-myelitis of the Femur—Necrosis.—Portion of a femur—macerated, to show the above.

A rough piece of necrosed bone is surrounded by a nearly complete case of irregular new bone. At one part the new case is deficient and the sequestrum exposed. At other places cloacæ are seen. On the side opposite the deficiency an attempt was made to destroy the new bone by the actual cautery, in order to remove the sequestrum. The black burned part has no doubt been killed, and has been in process of separation from the rest as is indicated by the sulcus round it.

B. C. 1. 5. M. 33.

6. 120. Acute Suppurative Osteo-myelitis—Necrosis, Chronic Enlargement.—Section of a part of a femur—macerated, illustrating the above.

The new bone in most places is as dense as ivory, while at other parts it is cancellous. Several cloacal apertures communicate between the surface and the cavities within. In one of these cavities a loose fragment of dead bone is seen. The others have probably contained similar fragments, which have dropped out. The walls of the cavities are porous, and might be called carious. They have been covered with granulations, from which suppuration has come. The outer surface of the bone presents the usual irregular character seen in such cases due to the active development of new periosteal bone.

This specimen shows by the density of the new bone how extremely difficult it is in some cases to remove enclosed sequestra. B. C. 1. 5. M. 40.

6. 121. Acute Suppurative Osteo-myelitis of the Tibia—Necrosis, great periosteal Enlargement, Amputation.—Left tibia, showing an enormously thickened case of new bone round necrosed fragments.

"James B., aged 20, labourer, admitted to the Royal Infirmary, Edinburgh, November 1825.

"Three years before amputation the disease commenced without any cause, and with a very severe pain. Inflammation, swelling, and suppuration ensued a year after this. A piece of bone was discharged. The sinuses have gradually increased in number, from which a great quantity of small bones have been discharged. His general health began to suffer about three months before amputation.

"On 20th November 1825 the following was observed. Upon the anterior part of his left leg are numerous small ulcerations, all of which lead down to the tibia, which can be felt to be in a state of caries. The limb, particularly at its lower part, is swollen and altered in form. From the sinuses there is a great discharge of pus, of a very fœtid odour. He experiences a constant dull pain. His general health is very much impaired, and his strength much reduced. Pulse 100. Frequent shivering and flushing of the countenance. Incessant thirst, tongue red, bowels loose.

"The limb was amputated through the thigh, but the patient died of septicæmia and secondary hæmorrhage."

This is a beautiful example of a new periosteal shell formed round necrosed fragments. Numerous cloacal apertures may be observed, especially along the inner surface of the bone, and sequestra can be seen through these apertures, lying loose, but imprisoned within the new shell. G. C. 1000. a.

6. 122. Acute Suppurative Osteo-myelitis of the Tibia—Necrosis, Chronic Periosteal Enlargement.—Lower end of a right tibia—macerated, to illustrate the above.

This specimen closely resembles the lower end of the previous one. No doubt there has been a similar clinical history. G. C. 1160.

Presented by Professor JAMES RUSSELL.

6. 123. Acute Suppurative Osteo-myelitis of the Tibia—

Necrosis, Periosteal Enlargement.—Tibia of a young person, in which the shaft having been necrosed has been surrounded by a new shell—macerated.

In this case there is a central sequestrum, which has originally consisted of almost the entire shaft. During the process of separation, however, it has been partially absorbed, and, as seen through the cloacæ, it is in many places rough and irregular. The shell surrounding the sequestrum, although so well formed, is slightly bent. It has numerous cloacal apertures.

G. C. 1183.

Figured in Russell on "Necrosis," plate i. page 177.

6. 124. Acute Suppurative Osteo-myelitis—Necrosis, Chronic Periosteal Enlargement.—Portion of the shaft of a femur or tibia—macerated, illustrating the above. A section has been made of part of the new case to show its thickness.

The sequestrum has evidently included the greater part of the diaphysis. The surface of the new case at places is eroded, but this has probably happened during the preparation of the specimen. B. C. 1. 5. M. 37.

6. 125. Acute Suppurative Osteo-myelitis of the Tibia—Necrosis, Chronic Enlargement. — Lower two-thirds of the right tibia of a young person—injected, soft parts cleaned off and in spirit, illustrating the above.

Upon the front of the preparation there is a considerable excavation, and in a crevice at its lower end there is a small loose scale of necrosed bone. The appearance of excavation is evidently due to irregular development of new bone round a superficial necrosis, which has now disappeared. This was formerly described as an ulcer of the tibia. If an ulcer of the skin had been present over the affected part of the tibia, as is probable, the ulcer in this case will have been secondary to the bone disease. B. C. 1. 5. M. 2.

6. 126. Acute Suppurative Osteo-myelitis of the Tibia—Necrosis, Ulcer of the Leg.—Portion of a tibia—macerated, illustrating the above.

A large loose sequestrum near the lower end has been partially surrounded by new bone. Near the upper end of the preparation there is a flattened enlargement, with an irregular and somewhat porous surface. This has probably formed the base of a chronic ulcer of the skin, secondary to the bone disease.

B. C. I. 5. M. 34.

6. 127. Acute Suppurative Osteo-myelitis of the Tibia—Necrosis.—Right tibia and fibula—injected, muscles removed, and in spirit, illustrating the above. A sequestrum removed from the tibia is fixed by a thread to the fibula.

A bridge of bone formerly lay over the large newly formed bone cavity, in which the necrosis was lodged. This bridge was cut across by the surgeon in order to extract the necrosis. The vascularity of the new bone is shown by the injection. The disease apparently had extended close to, if not into, the knee-joint.

G. C. 1056.

Figured in Russell on "Necrosis," plate ii. page 183.

Presented by Professor JAMES RUSSELL.

6. 128. Acute Suppurative Osteo-myelitis—Necrosis.—Preparation apparently of a tibia, illustrating the above.

There are two separate sequestra. They are only partially surrounded by a case of new bone, which shows cloacæ at some places and irregular gaps and apertures at others.

B. C. I. 5. M. 39.

6. 129. Acute Suppurative Osteo-myelitis of the Tibia—Necrosis.—Lower three-fourths of a left tibia—macerated, illustrating the above.

There are two large sequestra, partially surrounded by a

case of new bone. This is deficient along the front, and not well formed anywhere. The surface of the sequestrum has been blackened. B. C. 1. 5. M. 38.

6. 130. Acute Suppurative Osteo-myelitis of the Tibia—Necrosis.—Right tibia—macerated, illustrating the above.

There has been more or less complete necrosis of the shaft from end to end. The sequestrum has been separated from the remains of the original bone, and new periosteal bone has been developed round it. The new shell, however, is so imperfect that the greater part of the sequestrum is exposed. There is an oval aperture with rounded margins low down on the inner side of the new case, the nature of which is obscure; possibly it was made by a surgeon. B. C. 1. 5. M. 42.

6. 131. Acute Suppurative Osteo-myelitis of the Tibia—Necrosis, Imperfect Regeneration, Enlargement of the Fibula.—Right fibula and portions of tibia of a young person—macerated, illustrating the above.

"The disease had affected the leg for nine years." Amputation was performed with success. "The lower part of the tibia had become soft and spongy; the periosteum was much thickened at the diseased parts; there was extensive ulceration of the soft parts."

A portion, nearly three inches in length, is wanting from the lower end of the shaft of the tibia. The upper fragment of the tibia is for the most part irregular, but the surfaces are smoothed over. The upper end of the lower fragment is much rarefied. The fibula is much thickened, especially near the middle, by irregular deposits of bone on the surface. Opposite the deficiency in the tibia, however, the surface of the fibula is rarefied and has been partly absorbed.

Probably in this case there has originally been septic osteo-myelitis and necrosis, followed by a foul-spreading ulcer. This

might have at first caused the enlargement of the fibula, and afterwards extended into it, while its presence would account for the localised destruction of the tibia. G. C. 1482.

Presented by Professor J. W. TURNER and A. WATSON, F.R.C.S.E.

6. 132. Acute Suppurative Osteo-myelitis of the Tibia—Necrosis.—Lower two-thirds of a left tibia—macerated, illustrating the above.

This specimen is described in the General Catalogue as belonging to a person aged 14, and in the former printed Catalogue as belonging to an old person. From the general appearance of the specimen, and from the union of the lower epiphysis, the latter statement is evidently the correct one.

There has been necrosis, apparently, of almost the whole shaft, but the sequestrum, although pitted and eroded, has not been completely separated at the lower end. Along the inner and back part there has been a development of new bone, which is adherent to portions of the original shaft.

G. C. 1144.

6. 133. Acute Suppurative Osteo-myelitis of the Fibula—Necrosis.—Lower fourth of a tibia—macerated, illustrating the above. Lower necrosed portion wired to the part above.

The lower end has necrosed and has been partly absorbed. The upper portion shows a considerable crust of new periosteal bone on its surface.

W. C. G. 61.

(c.) *Sequestra, or portions of dead bone which have been separated from the living by natural processes.*

6. 134. Sequestrum, after Acute Suppurative Osteo-myelitis of the Ulna.—Upper three-fourths of an ulna which formed the above.

The patient was a little Cashmir girl. This piece of bone was removed by Dr. A. Neve in May 1887, after the acute symptoms had subsided. She made an excellent recovery, and had a useful elbow-joint.

At the upper end the necrosis has extended to the epiphyses, but at the lower end the line of separation has been a little above the epiphysis. G. C. 3308.

Presented by A. NEVE, F.R.C.S.E., Cashmir.

6. 135. Sequestrum, after Acute Suppurative Osteomyelitis of the Humerus.—Upper end of the shaft of the humerus of a boy, illustrating the above.

The boy was a comb-maker, and one of the combs which he made after his recovery is mounted along with the specimen.

The necrosis has involved the entire thickness of the upper end. The line of separation is somewhat oblique. G. C. 3355.

6. 136. Sequestrum, after Acute Suppurative Osteomyelitis of the Femur.—Portion of the lower end of the shaft of a young person's femur, illustrating the above.

The flat popliteal area, and almost the entire circumference above it, has become detached. The greater part of the surface is eroded, except at the lower end. The separation has been partly from within and partly from without. G. C. 223.

6. 137. Sequestrum, after Acute Suppurative Osteomyelitis of the Tibia.—Portion of the upper end of the shaft of a tibia, illustrating the above.

The sequestrum comprises cancellated as well as compact tissue. The separation has taken place chiefly from within. G. C. 202.

6. 138. Sequestrum, after Acute Suppurative Osteomyelitis of the Tibia.—Portion of the upper end of the shaft of a young child's tibia, illustrating the above.

The sequestrum is irregular at the point of separation below, but higher up it is smooth, and has comprised the entire thickness of the bone. G. C. 283.

6. 139. Sequestrum, after Acute Suppurative Osteomyelitis of the Tibia.—Large part of the shaft of a child's tibia, illustrating the above.

The whole thickness of the shaft has come away, with the exception of a small strip at one side, where the irregularity of separation is easily seen. The surface is smooth at the margins, so that the separation must have been from within.

G. C. 223. b.

6. 140. Sequestrum, after Acute Suppurative Osteomyelitis of the Tibia.—Large portion of the shaft of a tibia, illustrating the above.

Nearly the entire thickness of the bone has become necrosed. The fragment is very irregular, and is eroded on both its outer and inner aspects. G. C. 223. a.

6. 141. Sequestra, after Acute Suppurative Osteomyelitis.—Two portions of the shafts of long bones—probably of tibia, illustrating the above.

The lower and smaller piece is smooth, except at the margins and within, where it has been separated. The larger one, from an older person, has patches of rarefaction on its surface, as if it had been inflamed before it had finally necrosed. It shows the usual characters of pitting and irregularity at its margin and on the upper irregular prolongation.

B. C. 1. 5. M. 36.

6. 142. Sequestrum, after Acute Suppurative Osteomyelitis of the Tibia.—Portion of the shaft of a tibia of a young person, illustrating the above.

The entire thickness has died at one place. The surface is slightly pitted in front, and the margins are irregular.

G. C. 222.

6. 143. Sequestrum, after Acute Suppurative Osteo-myelitis of the Tibia.—Portion of the shaft of the tibia of a child, illustrating the above.

There is great irregularity of the outer surface, and at the margins of separation. The nutrient canal is well seen in the interior of the bone. G. C. 1008.

6. 144. Sequestrum, after Acute Suppurative Osteo-myelitis of the Tibia.—Large portion of the shaft of a tibia, illustrating the above.

The specimen represents nearly the entire thickness of the shaft at one place, with a varying proportion, mostly of the front at other places; the bone is greatly eroded and pitted, not only at the margins and on the internal surface, but over the greater part of the outer surface as well. G. C. 1170.

Presented by Professor JAMES RUSSELL.

6. 145. Sequestra, after Acute Suppurative Osteo-myelitis.—Two portions of the shafts of long bones, illustrating the above.

The longer piece shows the usual characters of a sequestrum, after suppurative inflammation. The other is very irregular, and has some new bone growth upon it.

These specimens are described in the M.S. Catalogue as "sequestrum, removed from tibia of a boy, aged 12 years." This probably refers to the longer piece only. G. C. 796.

Presented by Sir GEORGE BALLINGALL.

6. 146. Sequestrum, after Acute Suppurative Osteo-myelitis of the Tibia.—Portion of the shaft of a tibia, illustrating the above.

"The patient afterwards did well."

The bone shows the mark of a trephine. The irregularity of the margins is characteristic of the natural process of separation. G. C. 1162.

Presented by Professor JAMES RUSSELL.

6. 147. Sequestrum, after Acute Suppurative Osteomyelitis.—Portion of the shaft of a long bone, illustrating the above.

There is great irregularity on every aspect. G. C. 3354.

6. 148. Sequestrum, after Acute Suppurative Osteomyelitis of the Tibia.—Portion of the shaft of a tibia, illustrating the above.

The separation has been mostly from without.

G. C. 1174.

Presented by Professor JAMES RUSSELL.

6. 149. Sequestrum, after Acute Suppurative Osteomyelitis of the Tibia.—Two portions of cancellous tissue said to be from the tibia of a boy 12 years of age.

A cast of the leg and foot, after cure in this case was completed, was presented to the Museum along with this specimen, but it cannot now be traced (1893). G. C. 1786.

6. 150. Sequestra, after Acute Suppurative Osteomyelitis.—Eleven portions of the shafts of long bones, illustrating the above.

They show the usual characters. One piece has evidently followed amputation. The others seem, like the previous specimens, to have been idiophic. G. C. 1170.

Presented by Professor JAMES RUSSELL.

6. 151. Sequestrum, after Acute Suppurative Osteomyelitis of the Internal Cuneiform Bone.—Remains of an internal cuneiform bone which formed the above.

The patient was a badly nourished boy, aged 15. After a slight strain of the foot, he was seized with sudden and intense pain in it, which terminated in suppuration. About a fortnight after this, when the resulting sinus was explored, this bone was found loose. The parts were scraped and the boy made a slow recovery.

The surface of the bone is eroded and irregular.

G. C. 3453.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1892.**

6. 152. Sequestrum, after Acute Suppurative Osteomyelitis of Lower Jaw.—Portion of ramus and condyle of a lower jaw, forming the above.

Part of the condyle and the separated margin is rarefied and irregular. G. C. 1171.

Figured in Russell on "Necrosis," plate v. fig 4.

Presented by Professor JAMES RUSSELL.

6. 153. Sequestrum after Acute Suppurative Osteomyelitis of the Lower Jaw.—Portion of the right half of the body of a lower jaw, which formed the above.

The whole thickness of the bone has come away at the alveolar border, but only the outer plate below. The usual irregularity at the separated margins is seen. G. C. 1172.

Figured in Russell on "Necrosis," plate v. fig. 5.

Presented by Professor JAMES RUSSELL.

6. 154. Sequestrum after Acute Suppurative Osteomyelitis of the Lower Jaw.—Portion of a lower jaw, which formed the above.

"Andrew S., 12th July 1824, aged 62, a wright. The left cheek, especially of whole of left side of lower jaw, presents a rounded equable swelling, which on examination consists of the swollen glands

and of the integuments as well as of the body of the jaw, which is much enlarged. There is considerable purulent fœtid discharge from an opening below the alveoli of first molar, where the probe can be introduced for an inch amongst carious bone. All the molar teeth and their alveoli are carious, and there is an ulcerated state of the gums in general. The affection commenced eleven weeks back similarly to toothache, became much swelled, burst and discharged matter three weeks afterwards into the mouth as above described. Has occasionally very severe pains in the" affected part. "His health has suffered much. Bowels have been very loose; pulse rather quick. Tongue foul; has poulticed the part frequently.

"16*th.*—Health much improved. Tongue clean. Bowels still rather loose. External tumour much less, but a large mass of the bone is movable, along with the alveoli of all the molar teeth.

"25*th.*—A piece of the lower jaw-bone, of two inches in length and half-an-inch in breadth, including the canal for the artery and nerve, was extracted yesterday with great ease and little pain. The cavity left was stuffed with dry lint. There is yet considerable swelling of the cheek. Health pretty good.

"27*th.*—Another large plate of bone extracted yesterday. Granulations look healthy. In other respects he is quite well."

28*th.*—Dismissed cured.

The specimen shows the usual irregularity at the separated margins. The groove which formed part of the dental canal is clearly seen.

G. C. 991.

6. 155. Sequestrum, after Acute Suppurative Inflammation of the Alveolar Border.—Portion of the jaw of a child, which formed the above.

The separated piece contains two milk molar teeth.

G. C. 721.

(*d.*) *Repair after the separation of sequestra.*

6. 156. Reparation of Tibia after Removal of a Sequestrum.—Sequestrum and right tibia in section—macerated, to illustrate the above.

The patient, a boy, was aged eight years when the sequestrum was removed. The tibia from which it had been taken was obtained six years afterwards, *i.e.* when he had reached the age of fourteen.

The sequestrum shows the usual characteristics. The new tibia is curved forward, and is thickened, especially on its inner surface and behind. There is a well-marked medullary cavity, partially occupied by cancellated tissue, and with compact walls, which are thick and dense, especially about the middle. The thick part is the seat also of the bend, and this was doubtless the place from which the sequestrum came. Probably the bone yielded by being used before it was solid. The thickening may have followed afterwards from strain. Compare the rickety tibia, No. 6. 38. G. C. 1143.

Presented by Professor JAMES RUSSELL.

6. 157. Reparation of Tibia after Removal of a Sequestrum.—Sequestrum and left tibia in section—macerated, illustrating the above.

The specimen was obtained eighteen years after the removal of the sequestrum.

The sequestrum, which has consisted of the entire thickness of the shaft, over the greater part of its extent shows the usual characteristics. The new tibia is somewhat bent, but in addition is very irregular. New bone has been thrown out on all sides, but especially over the shin, where there is also a shelf-like projection towards the outer side. The medullary canal has been filled in, if a new one was ever formed. At each end there is a cavity in the cancellous tissue, but these may have been made in preparing the specimen.

A large ulcer has probably remained after the sequestrum was removed, and having become chronic, has produced secondary changes upon the newly formed tibia. G. C. 1142.

Presented by Professor JAMES RUSSELL.

B. Where the Organisms have reached the Bone through Wounds in the adjacent Soft Parts.

a. Disease in bone secondary to ulcers.

6. 158. Ulcer of the Leg extending down to the Bone.—

Section of a tibia—injected with vermilion and in spirit, to illustrate the above.

The granulating margin of an ulcer of the soft parts has been left surrounding an area of the bone, which has evidently formed its base. Part of this area is covered by imperfect granulations, part is bare, and part shows a development of new sponge-like bone. The section shows the compact tissue beneath the ulcer to have been thickened by a deposit on the surface.

B. C. 1. 5. M. 3.

6. 159. Ulcer of the Leg extending down to the Bone.—Section of the previous specimen—macerated, to illustrate the above.

The surface of the bone which lay underneath the granulations on the floor of the ulcer is rough and porous. It has been a new development, but has apparently been invaded by the ulcer as it became deeper. B. C. 1. 5. M. 3.

6. 160. Invasion of the Tibia by an Ulcer of the Leg.—Portions of a tibia—macerated, to illustrate the above.

Over an area of about three inches in length the bone is hollowed out, and is porous on the surface, while irregular bone has been developed round about. Apparently this has been caused by an ulcer of leg extending downwards into the bone.

B. C. 1. 5. M. 17.

6. 161. Invasion of the Tibia by an Ulcer of the Leg.—Portion of an injected right tibia. Soft parts removed, except those which formed the ulcer—in spirit, to illustrate the above.

An area of the bone has been exposed on the floor of the ulcer, and a section has been made to show the relations of

this piece to the rest of the bone. The bare patch has been surrounded by vascular granulations, which have formed a trench round it. It has thus evidently been necrotic, and in process of separation. Beneath the bare piece there has been a small abscess in the cancellated tissue. G. C. 1052.

6. 162. Invasion of the Tibia by an Ulcer of the Leg.—Section of portion of the previous specimen—macerated, to illustrate the above.

During maceration the bone was accidentally broken, and has been wired together.

The surface of the bare, necrotic piece of bone is porous. The groove surrounding it is well shown. Beyond the groove the very porous character of the bone, which during life was covered by granulation tissue, should be noted. This part merges off above into new periosteal bone growth. G. C. 1052.

b. Where the chief changes are in the form of rarefaction.

6. 163. Rarefaction of the Ulna after Compound Fracture.—Upper end of a left ulna—macerated, illustrating the above.

The lower end of the fragment is very irregular, and is partially absorbed. The surface is covered irregularly with periosteal new bone, while at places on the front the interior is seen to be rarefied and absorbed. This has probably been the result of a bad compound fracture. B. C. 1. 5. M. 96.

6. 164. Rarefaction and Necrosis of Femur after Amputation.—Portion of a femur, removed from a stump—macerated, to illustrate the above.

One portion of it is dead, and has been in process of separation. The rest is opened out and irregular, with some periosteal new bone on the surface. The rarefactive change, if anything, preponderates. F. P. C. 552.

Presented by Professor JAMES RUSSELL.

6. 165. Rarefaction of Femur after Compound Fracture.—Lower end of a right femur—macerated, to illustrate the above.

The broken surface is opened out, and some new bone has been developed near. At the back, near the upper end, there are two distinctly punched-out holes, possibly due to absorption by granulations. F. P. C. 397.

6. 166. Rarefaction of the Tibia after Compound Fracture.—Section of the distal end of a left tibia—macerated, to illustrate the above.

There has been absorption of the upper end, with development of new bone on the adjacent surface. This has probably been a case of compound fracture, with prolonged suppuration. B. C. 1. 5. M. 81.

6. 167. Rarefaction of the Shaft of a Tibia, with some new Periosteal Growth from some Septic Condition.—Right tibia—macerated, illustrating the above.

Over nearly the whole of the shin surface the bone is rarefied and rough. New bone has been thrown out on the posterior surface, with appearances very suggestive of septic inflammation. The anterior and posterior parts of the articular surface have apparently been attacked. B. C. 1. 5. M. 66.

6. 168. Rarefaction of the Shaft of the Femur from Sepsis after Amputation.—Portion of the shaft of a femur—macerated, illustrating the above.

Septic inflammation must have followed the amputation. Some periosteal bone has been thrown out for several inches above the lower end. The surface of the bone all over is opened out, evidently from absorption round the blood-vessels. This is a good example of septic rarefactive ostitis, or what may be called a septic form of caries. B. C. 1. 5. M. 29.

6. 169. Rarefaction of Fragments of the Fibula after Compound Fracture.—Lower half of a fibula, portions wanting—muscles cleaned off—dried, to illustrate the above.

About three inches of the bone have disappeared. The margins of the remaining fragments are rarefied, and a crust of new periosteal bone has been developed near. These changes have probably been caused by a severe compound fracture.

G. C. 1144.

Presented by Professor JAMES RUSSELL.

6. 170. Absorption and Irregular Outgrowth of the Tibia after Compound Fracture.—Lower end of a right tibia—macerated, illustrating the above.

The upper end of the fragment is atrophied and smoothed off at some places, while at others it shows irregular outgrowths. The case has apparently been one of compound fracture in process of healing by fibrous tissue. B. C. 1. 5. M. 80.

c. Where the chief changes are in the form of enlargement.

6. 171. Periosteal Thickening following Compound Fracture.—Upper portion of a right fibula, after fracture—macerated, showing the above.

At the broken part there is some irregularity from absorption, and beyond that a crust of new periosteal bone has developed. This is probably the result of a compound fracture.

B. C. 1. 5. M. 87.

6. 172. Rarefaction and Periosteal Crust from a Septic Wound.—Lower half of a right fibula—macerated, illustrating the above.

There are marks of rarefactive ostitis at the malleolus, and

a crust of new periosteal bone is seen in patches up the shaft. The cause of the septic condition is obscure—possibly a compound fracture of the tibia. B. C. 1. 5. M. 25.

d. Where the chief changes are in the form of necrosis or death of a palpable portion.

(*a.*) *Where the dead piece has been in process of separation.*

6. 173. Septic Osteo-myelitis following Compound Fracture — Necrosis.—Section of an injected tibia — muscles dissected off and in spirit, illustrating the above.

The patient died of erysipelas and tetanus about two months after the fracture.

"Necrosis took place, and the limits of the dead portion are marked by bristles." The fragments have not been in good position. The broken ends are united by fibrous tissue. There is considerable thickening round about. B. C. 1. 1. M. 45.

6. 174. Septic Osteo-myelitis and Necrosis following Gunshot (Compound) Fracture.—Portion of the shaft of a femur—macerated, illustrating the above.

The wound was received at the battle of Waterloo.

The fracture has been comminuted, and the broken ends are irregular. The surface of the dead pieces is smooth and unchanged. There are marks of rarefactive ostitis beyond the dead parts, and a trench separates them from the living bone in the usual way. F. P. C. 218.

Presented by Professor JOHN THOMSON.

6. 175. Septic Osteo-myelitis following Gunshot (Compound) Fracture.—Portion of the shaft of a femur, illustrating the above.

The wound was received at the battle of Waterloo.

The small necrosed piece is in process of separation as in the previous case. Beyond the area of rarefaction there is a slight crust of new periosteal bone. F. P. C. 219.

Presented by Professor JOHN THOMSON.

6. 176. Septic Osteo-myelitis following Gunshot (Compound) Fracture.—Portion of the upper part of a right femur, illustrating the above.

The wound was received at the battle of Waterloo.

This specimen shows essentially the same features as the last, but with more new periosteal bone above the line of demarcation. F. P. C. 220.

Presented by Professor JOHN THOMSON.

6. 177. Septic Osteo-myelitis and Necrosis following Compound Fracture.—Sections of part of a femur—macerated, illustrating the above.

The smooth dead bone at the seat of fracture has been in process of separation. The rarefaction involved thereby has occurred mostly on the outer surface, but it is visible also on the medullary aspect. G. C. 1159.

Presented by Professor JAMES RUSSELL.

6. 178. Septic Osteo-myelitis and Necrosis following Amputation.—Portion of the shaft of a femur after amputation—macerated, illustrating the above.

The sawn end has necrosed, and has been in process of separation. Immediately above the necrosed piece an imperfect collar of new periosteal bone has been formed, and the surface of the rest of the shaft shows the effects of rarefactive ostitis, combined with a limited amount of new periosteal bone growth. G. C. 1158. a.

Presented by Professor JAMES RUSSELL.

6. 179. Septic Osteo-myelitis and Necrosis following Compound Fracture.—Lower two-thirds of the shaft of th left tibia of a boy (epiphysis wanting)—macerated, illustrating the above.

There is a necrosed portion at the upper end in process of separation. Some new periosteal bone has been thrown out on the shaft below. B. C. 1. 5. M. 24.

6. 180. Septic Osteo-myelitis and Necrosis following Compound Fracture. — Greater part of a broken tibia —fragments wired together—and lower end of fibula—macerated, illustrating the above.

The greater portion of the upper fragment of the tibia is irregularly pitted on the surface, and apparently has been in process of separation from the rest. A mass of irregular bone, chiefly of new formation, lies on the outer side between the two fragments. Near the seat of fracture the lower fragment has new bone developed on its anterior and inner aspects, but not behind. The fragment of the fibula shows an area of necrosis at the seat of fracture, and a slight periosteal crust below.

Figured in Russell on "Necrosis," plate vi.

G. C. 1184.

6. 181. Septic Osteo-myelitis and Necrosis of the Humerus after Amputation—Pyæmia—Death.—Sections of the upper half of a humerus—partially macerated, and in spirit, to illustrate the above.

The patient was a man aged 21, whose forearm forms the specimen No. 6. 111. He died of pyæmia after amputation above the elbow.

The greater part of the shaft has necrosed, and over the surface of this part, but separate from it, a thin shell of new periosteal bone has been formed. It may be noted that the granulations on the deep or inner surface of this new shell have attacked the outer surface of the necrosed shaft. The upper end of the shaft is rarefied, and has evidently been

infiltrated with pus, and the head has necrosed and formed several separate fragments. This specimen illustrates septic caries and necrosis of the cancellated tissue, with necrosis also of the compact tissue. G. C. 982.

6. 182. Septic Osteo-myelitis and commencing Necrosis after Scalp Wound.—Calvarium (with permanent frontal suture)—macerated, illustrating the above.

A large, smooth area of what seems to have been necrosed bone in an early stage of separation is seen on the front, chiefly on the left side. There is a shallow line of demarcation marked off round it. G. C. 912.

6. 183. Septic Osteo-myelitis and commencing Necrosis of the Skull after severe Scalp Wound.—Skull-cap—macerated, illustrating the above.

"This man had his scalp torn off the skull. It was replaced. Suppuration under the scalp followed, and he died finally of suppuration of the membranes of the brain."

The dead portion is smooth, and round it the bone is porous from the enlargement of vascular channels. On the interior, especially along the middle line, marks of increased vascularity are visible. B. C. 1. 2. M. 14. e.

6. 184. Septic Osteo-myelitis and Necrosis of the Skull, following a Scalp Wound.—Left half of a calvarium—macerated, illustrating the above.

There is a small scale of necrosed bone in process of separation upon the front of the parietal bone below the temporal ridge. F. P. C. 477.

Presented by Professor JAMES RUSSELL.

6. 185. Septic Osteo-myelitis and Necrosis, following Gun-shot (Compound) Fracture of the Ribs.—Portion of a chest wall—in spirit, illustrating the above.

The ribs are broken and greatly comminuted, and some portions have apparently been necrotic. The pleura is thickened and covered with lymph. A small portion of lead was found in the soft parts, thus giving a clue to the possible cause of the condition. G. C. 3356.

(*b.*) *Where the dead piece has become loose, but has remained in position, and has acted as a source of irritation.*

6. 186. Septic Osteo-myelitis and Necrosis of the Tibia following Fracture (Compound ?).—Lower end of the left femur of a child, along with the tibia and fibula—partially cleaned and dried, to illustrate the above.

"The injury was received on 1st February 1805, and the limb was removed on 10th October in that year. The process of regeneration being exceedingly slow, amputation was performed in order to save the patient."

The upper two-thirds of the shaft of the tibia is smooth, and has been separate from the epiphysis and adjacent soft parts. Its lower end is concealed by a shell of new bone in which there is a cloaca. The sequestrum shows a sharp margin at the back just above the level of the new shell. The fracture has therefore probably been at the lower end. The texture of the lower end of the femur is thin and light. G. C. 1178.

Presented by Professor JAMES RUSSELL.

6. 187. Septic Osteo-myelitis, Necrosis, and Chronic Enlargement of the Femur following Amputation.—Portion of the shaft of a femur—macerated, illustrating the above.

There is a large deficiency at the back and lower end of

the preparation, from which a sequestrum has apparently been removed. The front of the preparation is covered by an irregular crust of new bone. G. C. 1158.

Presented by Professor JAMES RUSSELL.

6. 188. Septic Osteo-myelitis, Necrosis, and Chronic Enlargement of the Femur following Amputation.—Portion of the shaft of a femur—macerated, illustrating the above.

A graveyard fragment, probably a portion removed in a secondary amputation.

There is much irregularity of the surface, and a deficiency exists at the lower end and in the interior, as if due to the removal of a sequestrum. The upper end of the preparation has been sawn across. B. C. 1. 5. M. 63.

6. 189. Septic Osteo-myelitis, Necrosis, and Chronic Enlargement of the Tibia following Amputation.—Portion of the shaft of a right tibia—macerated, illustrating the above.

Probably a portion removed in a secondary amputation.

There is a rough periosteal crust near the lower end, which is itself irregular, and shows a deficiency extending into the interior—probably due to the removal of a sequestrum.

G. C. 1133.

Presented by Professor JAMES RUSSELL.

6. 190. Septic Osteo-myelitis, Necrosis, and Enlargemen of the Tibia following Compound Fracture.—Lower end of a right tibia—macerated, illustrating the above.

At the upper irregular end of the preparation there is a small white piece of necrosed bone lying between an irregular mass of

new bone and a rarified portion of the original shaft. Much new periosteal bone has been thrown out on the surface all round. The case has probably been one of compound fracture.

W. C. G. 58.

6. 191. Septic Osteo-myelitis, Necrosis, and Enlargement of the Tibia following Amputation.—Upper third of a right tibia—macerated, illustrating the above.

A considerable portion of dead bone is seen running up upon the inner side, and its lower end has been part of a sawn surface. It has been separated, but has been fixed in position by partial development of new bone round it. The rest of the shaft of the tibia shows new bone growth on the surface and absorption within. Probably two other large pieces of necrosed bone have been removed from the gaps on the front and outer sides.

B. C. 1. 5. M. 32.

6. 192. Septic Osteo-myelitis, Necrosis, and Enlargement of the Tibia following Amputation.—Upper three-fourths of a right tibia—macerated, illustrating the above.

There is a partial development of new bone on the surface, with a deficiency in front and on the inside, from which a sequestrum has probably been removed. The exposed portions of the original shaft are rarefied. G. C. 985.

6. 193. Septic Osteo-myelitis, Necrosis, and Enlargement of the Femur following Amputation.—Greater portion of the shaft of a femur—macerated, illustrating the above.

The bone has been greatly thickened, and the surface presents the usual characters of new periosteal bone formation. There are four cloacal apertures, through some of which dead pieces of bone can be seen. A necrosed fragment has evidently been removed from the centre of the lower end and from the front of the upper end.

B. C. 1. 5. M. 30.

6. 194. Septic Osteo-myelitis, Necrosis, and Enlargement of the Femur following Amputation.—Greater portion of the shaft of a femur—macerated, illustrating the above.

The bone has been very much thickened, and the surface is unusually irregular. There are numerous cloacal apertures, and several pieces of dead bone are seen through them. The disease has extended upwards nearly to the small trochanter.

B. C. 1. 5. M. 31.

(*c.*) *Sequestra—or portions of dead bone which have been separated from the living by natural processes.*

6. 195. Sequestrum of the Shaft of a Tibia after Septic Osteo-myelitis following Amputation.—A large portion of necrosed bone, apparently from the tibia of an adult.

The surface shows the usual pitting produced by granulations; but, in addition, the inner side shows some borings, apparently produced artificially. A node-like irregularity is seen towards the upper end of the specimen.

W. C. G. 54.

6. 196. Sequestrum of Femur after Septic Osteo-myelitis following Amputation for Gunshot Fracture.—

This was one of the cases treated after the Battle of Waterloo.

Except at the sawn surface, which is smooth, the specimen is very irregular, and its surfaces are pitted and eroded on both inner and outer aspects.

Figured in Hennen's "Principles of Military Surgery," 1st edition, plate iv. figure 3.

F. P. C. 224.

Presented by Professor JOHN THOMSON.

6. 197. Sequestrum after Septic Osteo-myelitis following Amputation.

"A very considerable portion more came away, but it was so soft and pliable that it would not preserve."

This specimen shows characters similar to the last.

G. C. 1157.

6. 198. Sequestrum formed by a First Phalanx from Septic Osteo-myelitis due to Whitlow.

It was from a left index finger, and was "removed by operation in a case of paronychia."

The specimen is partly eroded on the anterior surface, and has a slight crust of new bone upon the back. G. C. 1132.

Presented by Adam Hunter, F.R.C.S.E.

6. 199. Sequestrum of Lower Jaw due to Septic Osteo-myelitis following Injury.—Greater portion of the right half of the body of the lower jaw of a boy, and a piece of clay pipe stem, to illustrate the above.

The boy was smoking a cutty pipe. His father in trying to knock it out of his mouth drove the stem into the jaw, where a portion broke off and remained unobserved. Inflammation and suppuration supervened, and eventually the large sequestrum shown became loose. Professor James Miller removed it, and found within it the piece of pipe stem which is now mounted along with it.

The specimen shows at many places the irregularities associated with the process of separation. G. C. 3187.

Presented by A. G. Miller, F.R.C.S.E.

6. 200. Sequestrum from the Skull due to Septic Osteo-myelitis following Fracture (Compound ?).

The bone shows the mark of a trephine. Both tables are smooth on the inner surface, but the one has been more extensively absorbed than the outer. The margins of both plates are very irregular, and the diploë has been absorbed for some way between them. F. P. C. 482.

Presented by John Thomson, F.R.C.S.E.

6. 201. Sequestrum from the Skull due to Septic Osteomyelitis following Injury.

The bone was "denuded of periosteum by accident and subsequently thrown off."

The bone is exceedingly irregular and eaten out by the action of granulations. G. C. 1168.

4. **Inflammation of Bone produced by the Tubercle Bacillus.*

a. Where the chief changes are in the form of rarefaction and absorption, *i.e.*, a tubercular form of caries.

6. 202. Tubercular Disease of Carpal and Metacarpal Bones.—Section of part of the right hand of a woman—injected, and in spirit, showing the above.

Mary A., æt. 26, Shetlander, had a tubercular appearance and family history. Six months before coming to Hospital she had "acute rheumatism" (tuberculosis?) which did not affect the joints of the right wrist, although it attacked almost all her other joints. She believed she had twisted this wrist while turning in bed when suffering from the "rheumatism." The wrist and hand gradually became swollen, painful, and unnaturally movable. Fluctuation ensued. Amputation was performed above the wrist. A week later she had severe pain in her head. There was no phthisis, but death occurred shortly afterwards from general tuberculosis. No post-mortem examination was obtained.

There are caseous deposits in many of the carpal bones and in the bases of the metacarpals. Some of these centres are surrounded by a vascular area, and in some cases the caseation has spread from one adjacent bone to another. At some places the bones are softened, vascular, and broken down. In many places the cartilage has disappeared, having been chiefly attacked from within.

The non-vascular portion of the radial side of the unciform consists of hard dense bone, in the others the non-vascular portion is caseous and soft. G. C. 3072.

Presented by A. G. Miller, F.R.C.S.E., **1889.**

6. 203. Tubercular Disease of the Sternum.—Sternum of a

* See series 7 for other examples of tubercular disease of bone.

negro, with portion of overlying skin—in spirit, to illustrate the above.

A sinus shown in the skin communicated "with a vomica of the lungs." The bone seems to have been greatly destroyed and to have been replaced by granulations.

B. C. 1. 5. M. 10.

6. 204. Tubercular Disease of the Sternum.—Sternum—macerated, illustrating the above.

The manubrium and lower portion of the body is extensively absorbed and opened out, apparently by tubercular inflammation. B. C. 1. 5. M. 11.

6. 205. Tubercular Disease of the Sternum.—Manubrium and part of the body of a sternum—macerated, illustrating the above.

An abscess, probably tubercular, "had formed beneath the sternum."

The bone is lightened and partially absorbed, especially at the posterior and right margins. G. C. 656.

6. 206. Tubercular Disease of the Clavicle.—Left clavicle—macerated, illustrating the above.

There is a large irregular erosion on the upper surface, about the middle. The walls of this excavation are rarefied, and the bone in front is reduced to a mere perforated shell. There is comparatively little new bone formation round this eaten-out part, but at the outer end of the clavicle some may be observed. Probably this has been a case of tubercular disease. W. C. G. 26.

6. 207. Tubercular Disease of Radius and Ulna.—Right radius and ulna—macerated, illustrating the above.

The upper end of the radius shows patches of absorption passing into the interior and through to the other side without any deposit of new bone on the surface. The ulna shows a similar condition at two places, one at the upper end on the inner side, and another at the back of the shaft. Tubercular disease seems the most probable cause of this condition. G. C. 994.

6. 208. Tubercular Disease of the Femur.—Upper end of a right femur—macerated, illustrating the above.

There are large patches of absorption and rarefaction on the back of the shaft and below the lesser trochanter. The surface of the bone is also somewhat rarefied, especially towards the lower end of the specimen. Possibly this has been a case of tubercular disease. F. P. C. 387.

b. Where the chief changes are in the form of absorption and enlargement.

6. 209. Tubercular Enlargement of the Humerus.—Lower end of the shaft of a humerus, portion cut out to show the interior—macerated, illustrating the above.

The interior of the bone is rarefied and hollowed out, and there is a shell of variable thickness on the surface, giving the appearance of expansion. The shaft of the bone above the diseased part has an exceedingly thin shell, and the medullary canal communicates with the hollow below. This condition was formerly called "spina-ventosa." G. C. 1152.

Presented by Professor JAMES RUSSELL.

6. 210. Tubercular Enlargement of the Lower End of the Femur.—Lower end of a left femur, with anchylosed patella—macerated, illustrating the above.

The articular surfaces are very irregular, and one is partially deficient. The interior is rarefied and partially absorbed,

and there is some new bone on the surface. This has evidently been a case of tuberculosis of the knee-joint, which has healed with extensive distortion. It was formerly described as "spina-ventosa."

There is a peculiar crack in front of the specimen, for which it is difficult to account. As there is some new bone over and near it, it may have been caused in an attempt to straighten the limb. F. P. C. 650.

Presented by Professor JOHN THOMSON.

6. 211. Tubercular Enlargement of the Lower End of the Tibia.—Lower end of a right tibia—macerated, illustrating the above.

Several apertures seen in the expanded shell communicated in the recent condition with an abscess in the soft parts.

There has been enlargement on the surface, and absorption within. The interior of the bone has an irregularly scooped-out appearance. The disease has probably been tubercular.

W. C. G. 27.

6. 212. Tubercular Abscess and Enlargement of the Lower End of the Tibia.—Section of part of a left foot and lower end of the tibia—macerated, illustrating the above.

"Mrs A., aged 43, a delicate, nervous woman, suffered from suppurating cervical glands several years ago; her family and personal history was otherwise good. Three years ago pain began in the left loin, and extended down gradually to left ankle, and remained there for three months. It subsided completely, but returned in a few months, as result of a blow on the ankle. An abscess formed and was opened, and healed after discharging for a few months. The abscess opened again, and was relieved by carbolic acid fomentations, but returned one month before admission to the Infirmary. The patient was able to walk until within a week of admission, though with difficulty. The large abscess cavity of tibia was opened into, and caseous matter was scraped out. In fourteen days pain spread to ankle, and amputation became necessary."

The specimen shows the abscess in the tibia laid open. The walls at the bottom are covered by bare and dead (non-

vascular) bone, higher up vascular granulations are seen, and still higher caseous material lines these granulations. The disease had spread high up in the tibia near to the upper thread, *i.e.* in the second section of tibia which is attached to the chief specimen. G. C. 2834.

Presented by P. H. Maclaren, F.R.C.S.E.

6. 213. Tubercular Abscess and Enlargement of the Lower End of the Tibia.—Lower end of fibula and section of tibia from the previous case—macerated, to illustrate the above.

The cavity in the tibia is lined by rarefied bone. On the outside there is much new bone formation. The fibula also shows new periosteal bone on the surface, but the cancellated tissue exposed below is not the result of disease, but from an accident during maceration. G. C. 2835.

6. 214. Tubercular Enlargement of Shaft of the Femur.—Section of a right knee-joint and adjacent bones—injected and in spirit, illustrating the above.

The patient was an elderly man. His leg was amputated for chronic ostitis.

The femur has been condensed, and the surrounding tissues thickened. The two cavities in the femur were occupied in the recent condition by a semi-transparent gelatinous material, which has been shrivelled and rendered opaque by the spirit. The structure of the tibia is practically normal, and may be compared with that of the femur. A caseous gland is seen in the popliteal space. G. C. 3215.

Presented by A. G. Miller, F.R.C.S.E.

6. 215. Tubercular Enlargement of the Shaft of the Femur.—The other half of the bones from the previous preparation—macerated.

The sclerosed condition of the femur is a striking contrast to that of the tibia, which is, if anything, atrophied. The cavities in this half of the femur correspond to those previously noticed in the other half. The periosteal surface of the femur shows irregularity from a deposit of new bone. G. C. 3216.

6. 216. Tubercular Enlargement of the Shaft of the Femur.—Section of the lower end of a right femur—macerated, illustrating the above.

"The patient was a woman aged 40. She had long complained of a deep-seated pain in and near the knee-joint, for which she had been blistered, but without much benefit. She died of phthisis pulmonalis."

The specimen shows a combination of erosion with new bone formation. The erosion is seen partly in the interior, where the cancellous tissue is destroyed, and partly on the surface, near the lower end, where there are pits and irregular excavations. The new bone formation is seen as an irregular crust on the surface of the lower end of the shaft, resembling the crust due to the irritation of pus-forming organisms.

G. C. 858.

Presented by Sir GEORGE BALLINGALL.

6. 217. Tubercular Enlargement of the Shaft of the Femur.—Other half of the previous preparation—in spirit, illustrating the above.

The spaces in the interior of the bone are occupied by granulation tissue, shrivelled up by the spirit. On the surface similar material has been left in one or two places. G. C. 858 a.

Presented by Sir JOHN BALLINGALL.

c. Where the chief changes are in the form of necrosis, combined with absorption or enlargement, or both.

6. 218. Tubercular Disease of the Head of the Tibia.—Upper end of a left tibia—macerated, illustrating the above.

There has been advanced tubercular disease of the articular surfaces. The position previously occupied by articular cartilage is opened out and deeply excavated at three places. On the inner articular surface, near the back, there is a piece of necrotic bone in process of separation, and with part of its surface smooth. Round the head of the tibia some new periosteal bone has been thrown out, probably from sepsis.

F. P. C. 767.

Presented by Professor JOHN THOMSON.

6. 219. Tubercular Disease of the Clavicle.—Right clavicle —macerated, illustrating the above.

The bone is very irregular. Portions have been eaten out as if by the burrowing of tubercular granulations, or after the separation of sequestra, and numerous bridges have been left, connecting outstanding spicules with the rest of the bone. The sternal end is the part most affected; the outer end is scarcely changed. Comparatively little new bone has been formed.

G. C. 3396.

6. 220. Tubercular Necrosis and Enlargement of the First Metacarpal Bone.—Metacarpal bone of a thumb—macerated, illustrating the above.

A shell of new periosteal bone, with numerous cloacal apertures, has formed round the remains of the original shaft. These remains can be seen through the apertures, with the tissue partially opened out, and for the most part absorbed.

Described and figured in Mr Benjamin Bell's work on the Bones, plate i. fig. 7.

G. C. 937.

Presented by ADAM HUNTER, F.R.C.S.E.

6. 221. Tubercular Necrosis and Enlargement of the

First Metacarpal Bone.—Part of the metacarpal bone of a woman—macerated, illustrating the above.

It was removed by operation.

There is an imperfectly formed new shell, with a hollow interior, from which sequestra have probably been removed.

G. C. 995.

6. 222. Tubercular Necrosis and Enlargement of Metacarpal Bone and First Phalanx.—Part of metacarpal bone and phalanges of a finger—periosteum removed, and in spirit.

There is lateral enlargement of the first phalanx, with loss of substance near the base, probably from necrosis. The distal end of the metacarpal bone is enlarged. G. C. 566.

Presented by Sir GEORGE BALLINGALL.

6. 223. Tubercular (?) Necrosis and Enlargement of Metacarpal Bones.—Two metacarpal bones—macerated, illustrating the above.

There has been extensive new formation on the surface, with a partial re-absorption of the same. A sequestrum is seen in the interior of the more eroded of the two. Septic mischief has probably complicated this case.

W. C. G. 11.

6. 224. Tubercular Disease of Metacarpal Bone.—Plaster cast of right hand, with thumb broken off, illustrating the above.

A large swelling has accompanied tubercular disease of the metacarpal bone of the index finger. On the swollen part an ulcer is shown, which, no doubt, communicated with the bone.

F. P. C. 2887.

6. 225. Tubercular Necrosis and Enlargement of Meta-

tarsal Bone.—Metatarsal bone of great toe—macerated, illustrating the above.

The original shaft has been attacked by disease, probably tubercular, and lies with its tissue expanded and partially absorbed within a newly-formed periosteal shell. This shell has several large apertures like irregular cloacæ.

G. C. 1438.

Presented by JOHN CAMPBELL, F.R.C.S.E.

6. 226. Tubercular (?) Disease of Metatarsal Bone.—Left metatarsal bone of great toe—macerated, illustrating the above.

"The disease followed a general syphilitic (*sic*) affection in a young and apparently healthy man ; he had had also a cutaneous disease which was tedious and difficult of cure. The metatarsal bone was removed by the donor, and the toe preserved, but the wound did not heal during the man's stay in the Hospital, which was for many weeks. He had very considerable power in moving the great toe, and in a healthy subject little, or, indeed, no deformity, would have followed the operation."

On the inner side of the base there is a deep excavation, the wall of which is formed of rarefied bone.

The disease was considered to be syphilitic, but the diagnosis at that time (1828) may not have discriminated between syphilis and tuberculosis. G. C. 1115

Presented by JOHN CAMPBELL, F.R.C.S.E.

6. 227. Tubercular Disease of Metatarsal Bone.—Plaster cast of a front part of a left foot, showing great swelling and ulceration over the inner metatarsal bones.

The uniform swelling and the appearance of the ulcers are characteristic of the swellings of the soft parts in the neighbourhood of tubercular bone disease. F. P. C. 2891.

6. 228. Tubercular Disease of Metatarsal Bone.—Head of

the metatarsal bone of a great toe—macerated, illustrating the above.

It is rarefied and partially absorbed, and, as it is said to have been spontaneously separated, it has probably been a sequestrum due to tubercular disease. G. C. 1174.

Presented by Professor JAMES RUSSELL.

5. *Where the Inflammation has been due to the combined action of the tubercle bacillus and of pus-forming organisms.*

6. 229. Tubercular and Septic Disease of Ulna.—Upper end of a left ulna—macerated, illustrating the above.

The articular surface is opened out, and there is periosteal new bone formation on the shaft. Probably tubercular disease of the synovial membrane of the elbow had spread over the articular surface, and had afterwards become septic from the bursting of an abscess. W. C. G. 58.

6. 230. Tubercular and Septic Disease of Femur.—Lower end of the shaft of a right femur, the epiphysis wanting—macerated, illustrating the above.

Amputation was performed, probably for tubercular disease of the joint.

The lower end shows the lightening which often occurs near tubercular disease of joints. Some new periosteal bone has been thrown out on the side and back of the shaft.

F. P. C. 396.

6. 231. Tubercular and Septic Disease of Femur.—Left femur—macerated, illustrating the above.

From a churchyard.

There is great incrustation of new bone on the surface, with apparently tubercular disease of the lower articular end. The trochlear surface is rough, and is eaten out as if by

tubercular granulations. Probably this has been primarily a case of tubercular disease of the knee-joint, in which an abscess has burst, and turned septic, causing a secondary septic suppuration of the limb, and leading to this periosteal outgrowth on the femur. B. C. I. 5. M. 49.

6. 232. Tubercular and Septic Disease of the Tibia.—Left tibia—macerated, illustrating the above.

The upper half is very irregular, partly from new bone formation on the surface, especially at the back and on the sides lower down, and partly from erosion and opening out of the bone. The latter change is best seen on the inner tuberosity and at the back of the articular surface. This may have begun as tubercular disease of the head of the tibia which became septic. B. C. I. 5. M. 19.

6. 233. Tubercular and Septic Disease of the Femur and Tibia.—Part of femur, tibia, and fibula for about six inches above and below knee-joint—macerated, illustrating the above.

The femur is greatly thickened, and its surface is irregular. The lower articular surfaces are eroded and absorbed in front, and posteriorly are covered by irregular deposits of bone. The cancellated tissue above the articular surface is irregularly hollowed out, and what remains has been rarefied. The shaft of the bone is considerably thickened, and near the upper end shows a periosteal crust, like that due to septic inflammation. Below this, however, the new bone is irregularly absorbed and eaten into, as if by tubercular granulations. The articular surface of the tibia is more complete, although in front it shows considerable depression and excavation as if from tuberculosis. The shaft of the tibia is greatly thickened and condensed, and shows irregular new bone formation on the surface. This also has been attacked, but to a less extent than in the

femur. There are, however, on the inner and posterior surfaces, apertures and depressions, some of which lodge necrotic fragments. The fibula shows new periosteal bone formation all over. The outer surface of the patella is also very irregular, from new bone formation.

This has probably been a very chronic tubercular affection, with numerous septic sinuses.

F. P. C. 398.

Presented by Professor JOHN THOMSON.

6. 234. Tubercular and Septic Disease of the Lower End of the Tibia.—Lower end of a left tibia and fibula—macerated, illustrating the above.

The leg was amputated for extensive disease of the ankle-joint.

The lower half of the tibia shows some new periosteal bone on the surface, with erosion and destruction in the interior. The irregular erosions so often seen in tubercular disease are especially noteworthy about four inches above the ankle. The articular end seems to have been necrotic, but is also very irregular. The fibula has irregular new bone formation on its surface.

This has evidently been a tubercular case, complicated by septic changes.

B. C. 2. M. 39.

6. 235. Tubercular and Septic Disease of Radius and Ulna.—Left radius and ulna—macerated, illustrating the above.

The crust of new bone on the shafts seems to be the result of sepsis, but the irregular eating away of the crust, especially at the lower end of the ulna, where the original bone is also partly removed, has probably been due to tuberculosis.

B. C. 1. 5. M. 93.

6. 236. Healed Tubercular Disease of the Bodies of Vertebræ.—Section of the lower six dorsal vertebræ—macerated, illustrating the above.

The bodies of the eighth, ninth, and tenth vertebræ are greatly absorbed, and are infused into one mass of cancellated bone, with only a perceptible trace of the original inter-vertebral discs. The other bodies have been more or less anchylosed on the external surface, and the laminæ and spines of the vertebræ whose bodies are blended are fused together likewise. The specimen shows how completely a tubercular affection of bone may heal. B. C. 1. 3. M. 62.

6. *Inflammation of Bone due to Syphilis. A. The Skull.*

a. Where the chief changes are in the form of rarefaction, *i.e.* a syphilitic form of caries.

(*a.*) *Where the process of rarefaction has been advancing.*

6. 237. Syphilitic Disease of the Skull.—Skull-cap apparently of an old man—macerated, illustrating the above.

There are patches of opened-out bone ("caries") near the vertex. These patches seem to be due to localised increased vascularity, the opened-out vascular channels in places running together, and forming deficiencies on the surface. The greater part of the vault of the skull is otherwise unchanged, excepting for a slight porosity of the frontal bone. The interior of the skull-cap shows, near the vertex, marks of considerable vascularity, both in grooves for larger vessels and in pores for smaller ones. There is some irregularity also near the coronal suture. The sagittal suture is entirely obliterated, and the coronal suture nearly so. F. P. C. 291.

Presented by Professor John Thomson.

6. 238. Syphilitic Disease of the Skull.—Skull-cap of an elderly person—macerated, illustrating the above.

There are traces of syphilitic disease on the outside, and

extensive changes on the inside. On the outside the parietal bones near the vertex are roughened, chiefly by the enlargement of the vascular pores. On the frontal bone there is also roughening, not only by enlargement of vascular pores, but by numerous small grooves on the surface, probably for blood-vessels. On the inside the roughness is chiefly due to new bone formation round small vascular channels, although the pores for entering vessels are enlarged also. The roughness is most marked on the frontal bone, and especially near the middle line. At two places the surface of the inner table is left exposed, and is surrounded by ragged bony spicules of newly-formed bone. Possibly at these places there have been gummatous deposits between the bone and dura mater.

B. C. 1. 7. M. 8.

6. 239. **Syphilitic Disease of the Skull.**—Skull-cap of an aged person—macerated, illustrating the above.

The bone is roughened over both inner and outer aspects. The outside shows remains of its original smoothness at one or two places only, *i.e.* near the right frontal eminence, at the temporal ridges, and near the anterior and inferior angle of the right parietal bone. The roughness is due partly to the opening out of vascular channels and partly to shallow depressions of the surface, which are most marked at the back and on the left side of the vertex. At the back of each parietal bone there is a smooth patch entrenched round by a groove, as if necrosis and the process of separation had already begun. Inside, the roughness is very marked on the left side, especially at the site of the coronal suture, but is not quite so extensive on the right side of the middle line. The roughness is mostly due to the development of new bone, but also to the eating out of both the old and the new bone. Erosion and new formation must have gone on side by side. Small apertures are present near the middle of the coronal suture, and at other places.

B. C. 1. 7. M. 10.

6. 240. Syphilitic Disease of the Skull.—Skull-cap of an elderly person—macerated, illustrating the above.

The changes are best seen at and behind the vertex. The bone is unchanged below the temporal ridges, but elsewhere it is more or less porous. At the back and to the left side of the sagittal suture there are numerous irregular apertures, due apparently to enlargement of vascular channels. At places near the vertex areas of bone are mapped out by pores and erosions, and the surface of the upper part of the occipital bone is similarly roughened. The interior of the skull-cap, especially near places most affected on the outside, shows marks of considerable vascularity, but there is practically no bone formation. There are two small bony projections near the front, one on either side of the longitudinal sinus—apparently, by their smoothness, of long standing. The skull-cap is apparently not thickened, but is increased in weight from condensation of the diploë. B. C. 1. 7. M. 9.

6. 241. Syphilitic Disease of the Skull.—Portion of left parietal bone—macerated, illustrating the above.

There is great roughness on the outside, and sclerosis and thickening of the substance. The roughness on the outside is due to erosion, and the opening out and running together of vascular channels. The interior shows somewhat similar changes, only less marked. On the lower portion of the sawn surface the superficial openings are seen to penetrate well into the bone, and at some places to pass quite through it, while the bone on the section at the upper side is almost uniformly white and dense, like ivory. W. C. G. 41.

6. 242. Syphilitic Disease of the Skull.—Skull of an adult (probably a woman)—macerated, illustrating the above.

Changes are present on the frontal, parietal, occipital, superior

maxillary, and left malar bones. The frontal bone is the most affected. Between the frontal eminences there is a large patch where the surface is roughened and in places eaten away. The roughness is due to the opening out of vascular channels. From this patch extensions pass down to the external angular processes, and some tissue is lost at a corresponding part above each orbit. The rest of the vault of the skull shows changes similar to those seen on the frontal bone, only less marked. The bones of the skull are not thickened but the diploë is condensed. The left malar and superior maxillary bones are roughened on their facial aspect, partly by new periosteal bone, and partly by the opening out of vascular channels. A slight degree of the same change is seen on the right superior maxillary and malar bones. B. C. I. 7. M. 22.

6. 243. Syphilitic Disease of the Skull.—Skull and lower jaw of a negro—macerated, illustrating the above.

At the right frontal eminence and below the left one there is considerable loss of the surface from erosion, and possibly from superficial necrosis. On the left side the skull is also perforated. Round these places there are the usual pores due to increased vascularity, which have been opened out into irregular pits here and there. A somewhat similar condition is seen on the lower jaw, below and behind each mental foramen. Some roughness is seen on the malar and superior maxillary bones. In the interior of the skull there are marks of increased vascularity at various places, but especially on the frontal bone. The skull, as a whole, seems thick, and the sutures are distinct. B. C. I. 7. M. 25.

6. 244. Syphilitic Disease of the Skull.—Skull of an adult, apparently a woman—macerated, illustrating the above.

All over the vault there are patches of loss of surface or

bone ulceration, as it has been called, and the changed and unchanged parts are in close proximity. A certain amount of symmetry in the diseased patches is seen on the frontal bone, and on the front of the parietal; but the most advanced patch, which is on the right of the vertex, has no corresponding patch on the left side. At some places the bone is quite smooth, and at others the vascular channels are opened out, sometimes into fine pores, sometimes into pits and erosions, as noticed in previous specimens. On the patch to the right of the vertex these excavations have nearly encircled a piece of bone, which is itself porous. These excavations, or bone ulcers, seem to have been advancing on the right side, while others on the left have been healing over. The interior of the skull over the vault is roughened by enlargement of vascular channels. The diploë is almost entirely filled up by sclerosed bone, and the skull is somewhat increased in weight. The sutures are unusually distinct. B. C. I. 7. M. 23.

6. 245. Syphilitic (?) Disease of the Skull.—Portion of a skull—macerated, illustrating the above.

There is a loss of substance on the outer surface, which has penetrated into the interior. The section shows the bone to be thickened and sclerosed. F. P. C. 2962.

(b.) Where the process of rarefaction has been healing.

6. 246. Syphilitic Disease of the Skull.—Skull-cap—macerated, illustrating the above.

The upper surface, especially near the vertex, is roughened, but the irregularities are rounded off as if healing. On the inner aspect, especially at the upper portion of the longitudinal sinus, there are marks of increased vascularity.

G. C. 988.

6. 247. Syphilitic Disease of the Skull.—Skull-cap, with ununited frontal suture—macerated, illustrating the above.

Between the temporal ridges the parietal bones have been roughened on the surface, partly by vascular pores, and partly by irregular excavations, which, as in the previous specimen, have been smoothed over. The interior of the bone shows an increased number of channels for the branches of the middle meningeal artery. The sutures are unusually distinct.

B. C. 1. 7. M. 6.

6. 248. Syphilitic Disease of the Skull.—Skull—macerated, illustrating the above.

There are marks of previous disease on the frontal, malar, superior maxillary, and sphenoid bones. The frontal bone shows irregular rounded depressions and marks of increased vascularity on its anterior and lateral parts. Both malar bones, but especially the right, are roughened by enlargement of the pores for blood-vessels. A similar condition is seen below the nasal aperture and on the roof of the hard palate. The under surface of the body of the sphenoid behind the nasal septum is absorbed, and has an aperture into the sphenoidal sinuses. The interior of the skull shows numerous markings due to increased vascularity, not only on the frontal but also on the parietal bone, on which there are very few marks on the outside.

B. C. 1. 7. M. 20.

6. 249. Syphilitic Disease of the Skull.—Skull-cap of an elderly person—macerated, illustrating the above.

There are marks of former disease on the frontal and left parietal bones. Several irregular excavations are seen near the frontal eminences, especially on the left side, and there is another above the left parietal eminence. The margins of these are smoothed over as if the disease had subsided. The interior of

the skull shows marks of increased vascularity, especially in the frontal bone, where there has also been some thickening. The frontal bone where sawn is considerably thickened and condensed. B. C. 1. 7. M. 7.

6. 250. Syphilitic Disease of the Skull.—Skull of an adult man—macerated, illustrating the above.

The whole of the outside of the skull is roughened and irregular. On the right side the changes seem to have been of long standing and are partially healed. The lower part of the parietal bone has irregular tubercles smoothed over, and the surrounding bone has few vascular channels. On the corresponding part on the left side and in front there are also similar tubercles, but their margins are sharper and the bone round is more porous. The whole of the top of the skull is porous, and at places the apertures are opened out into irregular erosions. There is, in fact, scarcely any part of the external surface of the cranial bones which is not changed by an early or receding stage of the opening-out process. Most of the facial bones show similar changes. On the left eminentia articularis there is a smooth undermined and partially separated scale of bone, as if a layer of the articular surface had been necrosed. On the inside of the skull, except on the anterior and middle fossæ, the surface is roughened by the development of new bone and by the enlargement of vascular channels. B. C. 1. 7. M. 21.

b. Where the chief changes are in the form of enlargement.

6. 251. Syphilitic Disease of the Skull.—Portion of a left frontal bone—macerated, illustrating the above.

The outer surface shows several eminences, the surfaces of which are porous. The section shows the bone to be thickened, the texture being at some places rarefied and at others sclerosed in irregular patches. W. C. G. 39.

c. Where the chief changes are in the form of necrosis.

6. 252. Syphilitic ("Mercurial") Disease of the Skull.—Portion of the left half of the skull-cap—macerated, illustrating the above.

An irregular smooth patch in front of the parietal eminence is almost entirely surrounded by irregular depressions, which seem to be enlargements from dilated vascular channels. Similar but less advanced stages of the same process are seen behind this large patch. On the inside a certain amount of increased vascularity is traceable. The diploë is partially filled up, and the bone as a whole is increased in weight. The cranial sutures are nearly obliterated. F. P. C. 317.

Presented by Professor JOHN THOMSON.

6. 253. Syphilitic Disease of the Skull, advancing to Necrosis.—Skull-cap of an old person—macerated, illustrating the above.

There are patches of roughened surface on the frontal and parietal bones, but most marked on the right side, where the opened-out vascular channels have been in many places enlarged into irregular pits. Near the right parietal eminence irregular trenches are marked out round portions of the bone. At one place below, the trench communicates with the interior. On the inside of the skull the bone shows enlarged vascular channels all over, but most marked opposite the patches affected on the outside. Near the inner aspect of the right parietal eminence the bone is almost entirely eaten through over an area smaller than, but similar in shape to, that on the outside.

B. C. 1. 7. M. 12.

6. 254. Syphilitic Disease of the Skull, with Necrosis.—Oblique section through the upper part of the vault of a skull—macerated, illustrating the above. The bone has been trephined.

The reason for the trephine opening does not appear. The specimen shows an irregular piece of necrotic bone partially entrenched round, and with vascular channels in process of opening out extending beyond. The inside shows some enlargement of vascular pores. The diploë is condensed. The margin of the trephined aperture shows that the above patch of bone was being undermined from below as well as from the sides.

W. C. G. 47.

6. 255. Syphilitic Disease of the Skull, with Necrosis.—Skull-cap of an old person—macerated, illustrating the above.

The outer surface at the top shows roughness, chiefly from the increased size of the pores for blood-vessels. Above the right frontal eminence is a depression with a raised margin. The edges are rounded off, as if the part had been healing. Below the left parietal eminence an area of one and a half inches by three-quarters of an inch has been in process of separation, and is entrenched round by a distinct groove. The surface of this piece is porous and rough, as in other cases of syphilitic necrosis. Below the right temporal ridge the parietal bone has been trephined for reasons unknown. On the inside, below the mark near the right frontal eminence, there is a distinct thickening of bone, with marks of increased vascularity. Beneath both parietal eminences, especially the left, there are marks of increased vascularity. The diploë is condensed, and the bone is much increased in weight. The posterior part of the sagittal suture is entirely obliterated.

B. C. 1. 7. M. 11.

6. 256. Syphilitic Disease of the Skull, with Necrosis.—Portion of a parietal bone—macerated, illustrating the above.

A small necrotic piece, which is eroded on the surface, is partly undermined as well as grooved round. The interior of the bone shows marks of increased vascularity, and the diploë is,

for the most part, replaced by dense bone. This was formerly described as "mercurial caries, with commencing exfoliation of the outer portion of the skull." F. P. C. 318.

Presented by Professor JOHN THOMSON.

6. 257. Syphilitic Disease of the Skull, with Necrosis.—Portion of the vault of a skull—macerated, illustrating the above.

A large necrosed fragment in process of separation. The outside shows the disease less advanced on the right of the middle line. The roughness is in various stages from opened-out vascular channels to irregular erosions, and one of these is at one place nearly healed over. On the left side, a large fragment, whose surface is for the most part destroyed, has been partially separated, and a groove has been formed round it. From the inside it can be seen that the necrosis, except over a limited area, had not been complete all through, the deeper layers of the bone having furnished granulations for the process of separation. The general inner surface shows marks of increased vascularity. The bone, except at the necrosed part, has been thickened and condensed. W. C. G. 42.

6. 258. Syphilitic (?) Disease of the Skull, with Necrosis.—Anterior and left portion of a calvarium—macerated, illustrating the above.

The outer surface shows some roughness, chiefly in the form of superficial grooves for blood-vessels. Behind the coronal suture, near the middle line, there is considerable loss of substance, and a small trephine hole penetrates the inner table. A superficial layer of bone seems to have separated from the outer surface here, leaving an irregular deficiency with a ragged base. On the inside the bone is greatly thickened

and roughened by marks of numerous blood-vessels. Corresponding to the deficiency on the outside, there is a smooth necrosed portion of the inner table perforated by the trephine, and surrounded by a raised margin of thickened bone. It is triangular in shape, and leading from the apex of the triangle, and parallel with the coronal suture, is a deep groove upon a raised ridge of bone. In the absence of any clinical history, the explanation of those appearances, which differ from those of most of the ordinary specimens of syphilitic disease of the cranium, is difficult. G. C. 369.

6. 259. Syphilitic Disease of the Skull, leading to Necrosis.—Skull-cap, probably of a woman—macerated, illustrating the above.

From the vertex forwards the changes are more and more marked. Except on the necrosed part in front, and on the margins round it, the irregularities of the roughened surface have all been smoothed over. Some smoothing over is perceptible, even on the necrosed part itself, from which it would appear that the necrosis had resulted from a recrudence of the disease after the subsidence of a former attack.

About the level of the frontal eminences a mass of very irregular, apparently necrosed bone is in process of separation. It measures two and a half inches by one and three-quarter inches, and lies obliquely across the forehead. The groove round it penetrates the thickness of the skull completely at the upper and left parts, and in places below, but on the right side the groove does not go deeper than the diploë. For the most part the edges of the grooves overhang the dead part.

On the inside there is likewise a groove round the dead part, and this aspect of it is as rough and irregular as the outer one. There are marks of increased vascularity all over the interior of the vault, but especially in front. The section of the bone is greatly thickened in front of the necrosed area, but elsewhere it is thin. B. C. 1. 7. M. 15.

6. 260. Syphilitic Disease of the Skull, ending in Necrosis. —Portion of skull, upper and back parts wanting—macerated, illustrating the above.

There has been extensive destruction of the frontal and nasal bones. On the outer surface the parts not necrosed are roughened from increased vascularity. Almost the whole of the frontal region is occupied by a roughened sequestrum, which seems to have been detached and only held in place during life by the soft parts, for it is now glued into position. Its surface is roughened by apparently recent and old-standing changes, similar to those already described, and part of the surface seems to have been detached as a superficial necrosis. All round it there is a groove, which, however, has not penetrated through the inner table, and the margins of which for the most part overhang. The frontal sinuses are exposed, but their mesial septum remains. The bones forming the bridge and sides of the nose are wanting, and the ethmoidal and maxillary sinuses are freely exposed. The vomer is deficient, and there is a large gap near the front of the hard palate. The interior of the roof of the skull is roughened by marks of dilated blood-vessels, but to a less extent than might have been expected from the changes on the outside. Only at one spot—near the middle line in front—has the process of necrosis penetrated into the interior. On the base of the skull the bony ridges are sharp and strongly marked, both inside and outside. The section of the skull in the parietal and occipital regions is extremely thick, and the diploë is everywhere replaced by compact bone. F. P. C. 475.

Presented by Professor JOHN THOMSON.

6. 261. Syphilitic Disease of the Skull, ending in Necrosis. —Scalp of a man—macerated, illustrating the above.

"About two years before I saw this man he fell and struck his head against a log of wood. Some time after this he was grievously attacked with pains in his forehead, and about the shoulders and clavicles. Corona

veneris formed upon his forehead, and, the integuments ulcerating, disclosed a dead and black portion of the bone. This portion, after some months, came away. The caries extended, and a second portion was in progress of being thrown off. The dura mater burst, and fungus cerebri forming, the man sank into low delirium, with convulsions of the face, and expired."

The upper part of the skull shows at various places roughness and irregularity, which seem to have healed over. Occupying the greater part of the frontal bone are two sequestra, with their surrounding grooves. The larger is on the right side, and crosses the middle line below. It shows signs of old-standing disease on its surface, and has been completely detached. The smaller one on the left side has similar marks on its surface, and is surrounded by a groove, which below has penetrated through the inner table. On the inside, near the vertex, there are marks of old-standing vascularity, but near the necrosed pieces the roughness from increased vascularity is greater, and has apparently been recent. The process of necrosis has involved the inner table in both places, but the area of necrosis is less on the inner than on the outer surface.

B. C. 1. 7. M. 17.

6. 262. Syphilitic Disease of the Skull and Facial Bones, with Necrosis of the Palate.—Skull and lower jaw of a man who died from syphilis—macerated, illustrating the above.

"In the month of May last (1824) I was requested by a gentleman in town to visit the individual to whom this skull belonged, and found him lying on a couch, extremely reduced and emaciated; the face and upper part of the scalp covered with numerous blotches and incrustations, one of which was particularly prominent, and projected like a horn over the centre of the frontal bone.

"Various superficial ulcerations and blotches were also conspicuous on his body and limbs, but these he did not seem inclined to show me to their full extent, as he appeared to have lost all hopes of cure, and considered me, I believe, as only visiting him from motives of curiosity. The same idea rendered him very little communicative as to the history of his complaint, and he seemed quite unable to give any distinct or connected account of their progress. All I could learn from him was that the disease had commenced by an ulceration on the penis, and destroyed

part of the glands; that he had also been affected with buboes in the groins, and subsequently with ulceration of the throat, cutaneous eruptions, and exfoliation of spiculæ of bone from the nostrils; that he had laboured under the disease for three or four years, had been under the care of various practitioners, and had used much mercury, besides other remedies.

"He was now, I found, using the decoction of sarsaparilla under the direction of Dr Kennedy, which I desired him to continue; and after consulting with Dr Kennedy we agreed to prescribe the Plummer's Pills, of which he was directed to take three daily along with the decoction. Under this course a rapid amendment took place; the incrustations dropped off from his skin; he recovered his looks and flesh, and in short complained of nothing but an offensive discharge from the nostrils. His spirits got up, and he seemed to entertain sanguine hopes of recovery. In this state he came over from the Old Town to my house late one evening in the month of July, during the prevalence of a cold easterly wind; he complained of having caught cold, was exceedingly hoarse, and upon inspection the palate and fauces were found considerably inflamed. On enquiry I ascertained that of late he had been repeatedly out at night, and had been living altogether in a very irregular and dissipated manner. I ordered him home instantly, desired him to confine himself entirely to the house, to lay aside the use of the Plummer's Pills, to take a dose of salts, and to go into the warm bath; which directions, with the exception of the confinement, I have reason to believe he complied with.

"Soon after this an ulcer broke out in the palate immediately behind the incisors—the velum palate and tonsils also became ulcerated—the offensive discharge from the nostrils increased—pieces of the inferior spongy bone exfoliated—the teeth dropped from their sockets—and though mercury in every form had for some time been laid aside, a copious salivation now commenced, owing to the irritation from the diseased state of his mouth affecting the salivary ducts and glands. He was unable to take almost anything in the shape either of food or medicine. Of the latter nothing was recommended to him but bark, laudanum, laxations, and an alum gargle. He continued to linger for several weeks, and expired about the beginning of November, greatly emaciated, and exhausted by hectic fever.

"On examining the exterior surface of the cranium, a circular portion of the right parietal bone, about the size of a shilling, may be observed flattened and somewhat rough; from this an exfoliation had taken place previous to the patient's coming under my care. On the interior surface of the bone opposite to this spot the impressions of numerous small vessels are to be seen deeply indented into the bone, and giving it a rough scabrous feel.

"On the internal aspect of the frontal bone two circular

portions are to be seen marked by the impressions of numerous small vessels similar to what is observed on the parietal bone.

"Large portions of the superior maxillary bones, including the alveolar process of the front teeth, are in the process of exfoliation.

"On examining the base of the skull, the condyloid and cuneiform processes of the occipital bone and the posterior clinoid processes of the sphenoidal bone may be observed partially diseased" (Edin. Med. Chir. Trans. vol. i.).

On the interior, besides the points above noted, new bone has been thrown out round the numerous blood-vessels alluded to. G. C. 723.

Presented by Sir GEORGE BALLINGALL.

6.263. Syphilitic Disease of the Skull, with Destruction of the Nose.—Skull—macerated, illustrating the above.

"During life the patient exhibited a horrid spectacle. I could see into the throat, so as to observe the motion of the velum palate, while he was speaking. Some time after the disease was stopped in its progress, the cranium became affected. It did not, strictly speaking, exfoliate, but the whole substance came away. The pulsation of the brain forcing the dura mater against the edge of the bone, it was destroyed by ulceration, and fungus cerebri followed, when the man died."

There is an aperture just behind the centre of the coronal suture, extending backwards for two and a half inches. It is widest about half an inch from the front, where it measures two inches across, and becomes narrower towards the back. The edges are sharp and jagged, and the margin is bevelled from the outside. The bevelled portion on the front and left side is mostly smoothed over, as if the process had ceased there, but on the right side it is irregular, as if still in progress. The greater part of the frontal bone shows numerous vascular markings, producing a mosaic-like pattern, the result apparently of horizontally running blood-vessels. At one or two places there are patches of opened-out vascular pores. Below the right frontal eminence is a patch of necrotic bone, irregularly circular in outline, and measuring one and a half

inches across. This piece is surrounded by a distinct trench, which below has penetrated through the skull. The sides and back of the calvarium are comparatively unchanged, but the bone is increased in thickness and the diploë is partially filled up. The vomer, nasal, lachrymal, inferior turbinated, and greater part of the ethmoid and nasal portion of superior maxillary bones have entirely disappeared. The ethmoidal sinuses and the antrum of Highmore on each side are completely exposed from the nose. The back of the palate is gone, and only a trace of the nasal septum is seen at the roof. Marks of increased vascularity are seen on the malar bones below each orbit. The back of the skull shows at various places patches of roughness owing to increased vascularity.

B. C. 1. 7. M. 18.

6. 264. Syphilitic Disease of the Skull after Separation of a Sequestrum.—Portion of right frontal and parietal bones—macerated, illustrating the above.

In front there is an aperture with rounded margins, as if necrosis had separated and the part healed. Behind that, and separated from it by a bridge of bone, is another aperture, more irregular and with sharper margins, as if a sequestrum had only recently separated from it. On the inside there are marks of increased vascularity, old-standing in front and recent behind. Near the apertures the bone is irregular and eroded in both aspects, but this surrounding irregularity does not correspond on the two aspects. W. C. G. 46.

6. 265. Syphilitic Disease of the Skull after Separation of a Sequestrum.—Portion of the left half of a calvarium—macerated, illustrating the above.

There is an irregular aperture in the parietal bone, about three inches in diameter each way. The margins of this aperture are sharp, and a large sequestrum must have only recently separated from it. On the outer surface of the

parietal bone some new periosteal bone has formed below and in front of the aperture. The interior of the bone shows deepened grooves for blood-vessels, and, behind the coronal suture, there is a very deep one like that noted in a similar situation upon No. 6. 245. G. C. 368.

d. Sequestra, due to syphilis, after separation.

6. 266. Sequestra after Syphilitic Disease of the Skull.—Four sequestra from the skull, probably from different cases.

The largest, which measures four by three and a half inches at its greatest diameters, shows marks of old-standing and recent irregularity on both sides, but mostly on the inner side. Apparently the inner palate has only been involved in necrosis here and there, for its surface is very irregular. The other pieces, although smaller in size, seem to have more completely involved the whole thickness of the skull. In one, the outer table is comparatively unchanged, while the irregularity is very great on the inner side. In the other two the irregularity is most marked on the outer side, although distinct on the inner side also. G. C. 1169.

Presented by Professor JAMES RUSSELL.

6. 267. Sequestrum after Syphilitic Disease of the Skull.—Sequestrum, involving whole thickness of skull. Described previously as "mercurial exfoliation."

There is great irregularity on the outer surface and marks of increased vascularity on the inner surface. F. P. C. 480.

Presented by Professor JOHN THOMSON.

6. 268. Sequestrum after Syphilitic Disease of the Skull.—Sequestrum, which has involved both tables of a thickened skull.

From the skull of a young gentleman who died of affection of the spine.

The piece of bone is markedly irregular on both surfaces, and presents the usual characteristics of a syphilitic sequestrum.

G. C. 1620.

Presented by ADAM HUNTER, F.R.C.S.E.

6. 269. Sequestrum after Syphilitic Disease of the Skull.—Sequestrum (sawn through at one spot), formerly described as "mercurial exfoliation" of both sides of the skull.

The necrosis has involved the whole thickness of the skull, and both surfaces, but especially the inner, show the roughness and irregularity characteristic of a syphilitic sequestrum.

F. P. C. 481.

6. 270. Sequestrum after Syphilitic Disease of the Skull.—Sequestrum involving the whole thickness of the skull. Both surfaces show irregularity characteristic of a syphilitic sequestrum.

G. C. 1167.

c. Specimens illustrating healing after separation of syphilitic sequestra.

6. 271. Syphilitic Disease of the Skull after Separation of Sequestrum.—Frontal portion of a calvarium, with scalp—in spirit, illustrating the above.

Just below the roots of the hair, to the right of the middle line, there is a small healed ulcer of the skin, with a small fragment of necrosed bone on its base. The margins of the ulcer are smooth, and, though somewhat overhanging, seem completely covered with epithelium. On the floor below the necrosed fragment the bone is covered by a thin layer of fibrous-looking material, possibly epithelium. The interior of the bone has dura mater clinging to it in many places, and where bare shows marks of increased vascularity. The skull itself is thickened and condensed.

B. C. 1. 7. M. 1.

6. 272. Syphilitic Disease of the Skull after Separation of Sequestrum.—Skull-cap of an old person, probably a woman —macerated, illustrating the above.

On the frontal bone, to the right of the middle line, and extending downwards from about one and a half inches below the coronal suture, there is a rough irregular depression. It shows a perforation above, and ends in a deep branching groove below. The margins are bevelled off, and in some places the irregularities are rounded as if there the disease had been healing, while at others they are sharp as if it had been extending. The interior of the bone shows marks of increased vascularity, especially on the frontal bone, which is thickened on the right side; and shows irregular depressions on the left. The bone, as a whole, is thin, but the diploë is condensed. G. C. 367.

6. 273. Syphilitic Disease of the Skull—Healing after Extensive Destruction.—Skull of an adult—macerated, illustrating the above.

The disease has been most advanced on the frontal bone and on those of the face, round the nose and mouth. On the outside there is considerable roughness and porosity near the external occipital protuberance. The diploë, where exposed, seems for the most part normal. The whole of the lower part of the frontal bone is also roughened and irregular. Above, the irregularities are shallow, and the surface is smoothed over, but below they are deeper and the bone surface is porous. At one spot the frontal sinus has been opened into. The margins of the anterior nares have been attacked, and the bone is porous. The alveolar border shows similar changes, and many of the teeth must have fallen out shortly before death. The hard palate is roughened, and on the left side is perforated by a small aperture. The interior of the skull shows marks of increased vascularity, especially in the frontal region, but this is less marked than might have been expected from the condition of the outside. B. C. 1. 7. M. 24.

6. 274. Syphilitic Disease of the Skull—healed after Loss of Substance.—Portion of the right frontal and parietal bones of an old person—macerated, illustrating the above.

On the outer surface there are numerous smooth excavations and tubercles, and at one place a small perforation, with rounded margins. On the inside the changes are very slight, merely some irregularity near the perforation. The coronal suture is obliterated except at a small place near its lower end. This seems to be a case where the disease had completely subsided. Formerly described as "a caries of the left parietal bone."

G. C. 370.

6. 275. Syphilitic Disease of the Skull—healed after Loss of Substance—Skull-cap of an adult, with permanent frontal suture—macerated, illustrating the above.

On the right parietal bone, near the vertex, is a circular depression, one and a half inches in diameter, with a sinuous rounded margin and irregular base, which has been smoothed over. This is as if a superficial sequestrum had been separated some time before, and the part had healed over. In front of the left parietal eminence is a shallow depression, with a base, which is at one place smooth and at others rough, as if the disease have been in process of cure. The interior of the skull shows some marks of increased vascularity.

W. C. G. 18.

6. 276. Syphilitic Disease of the Skull—healed after Loss of Substance.—Portion of the front of a calvarium, with permanent frontal suture—macerated, illustrating the above.

There is a depression, one and a half inches long by one inch broad, between the frontal eminences. Its margins are bevelled off and smoothed over, and its base, which is also smoothed

over, is perforated by a narrow aperture communicating with the groove for the longitudinal sinus. The inner surface has marks of increased vascularity. The section of the bones shows thickening, but the diploë still present. B. C. 1. 7. M. 26.

6. 277. Syphilitic Disease of the Skull—healed after Loss of Substance.—Skull-cap—macerated, illustrating the above.

The anterior part of the frontal bone shows two large irregular depressions of the surface; one is on the right side, and is deeper, larger, and more irregular than the other, which extends from the middle line to the left frontal eminence. Except where the two depressions are contiguous, their margins are slightly but distinctly raised. On the left side this raised margin shows grooves and pores for numerous blood-vessels, as if the process had been in progress, while on the right side the surface of the raised part has been smoothed over. A small hole in the base of the right depression communicates with the interior. The cerebral surface shows marks of increased vascularity on the parietal and frontal bones. The section of the frontal bone is increased in thickness. At other places, although the bone is not thickened, the diploë is condensed. F. P. C. 476.

Presented by Professor RUSSELL.

6. 278. Syphilitic Disease of the Skull—healed after Separation of a large Sequestrum.—Anterior portion of the right half of a calvarium and roof of orbit—macerated, illustrating the above.

During life a fungus cerebri projected through the aperture left by the separation of a large sequestrum.

The aperture is irregularly circular, and measures two inches by three and a half inches in diameter. Its margins are rounded off, as if the disease had subsided and the parts had been healing. B. C. 1. 7. M. 16.

6. 279. Syphilitic Disease of the Skull—healed after Loss of Bone about the Nose and Left Orbit.—Anterior half of a skull—macerated, illustrating the above.

The bridge of the nose, nasal septum, and margins of the nasal cavity have been lost, and a single rounded aperture represents the anterior nares. There is a small aperture in the hard palate. The ethmoidal and sphenoidal sinuses are no longer traceable. Their position is now occupied by roughened bone. The antrum of Highmore on each side is nearly filled in by similar roughened bone, but an opening into the frontal sinuses is still present. The outer wall of the left orbit is for the most part wanting, and the disease here seems to have been in progress at the patient's death, although at other places it must have subsided. The interior of the skull is irregular, apparently from development of bone round the blood-vessels. The section of the cranial vault shows an increased thickness and partial filling up of the diploë. B. C. 1. 7. M. 19.

6. 280. Syphilitic Disease of the Nose and Mouth.—Cast in glue and glycerine of the face of a woman, illustrating the above.

The bridge of the nose has been destroyed, and its fleshy part is represented by an irregular scar. The upper lip is greatly scarred. This cast represents the appearance of patients after severe destruction of the nose.

G. C. 3557.

6. 281. Syphilitic Disease of the Bones of the Face, with very great Destruction.—Plaster cast of the front of the head and neck of a man, illustrating the above.

Described by Sir Charles Bell as "A cast exhibiting the effects of the disease called *noli me tangere*, or rather that kind of it which is called lupus, in which the face is gnawed or eaten away. The man from whom this was taken was long a patient in the Hospital. When he swallowed, the action of the muscles of the fauces could be observed."

The face has been destroyed, and the orbits, mouth, and nose are thrown into one common gap.

From the appearance of the face and the indefiniteness of former nomenclature, it seems right to classify this as syphilis.

B. C. 1. 6. M. 39.

B. The Skeleton.

f. Where the chief changes are in the form of enlargement.

6. 282. Syphilitic Disease of Skeleton.—Male skeleton, wanting the skull, illustrating the above.

The vertebræ show an increased vascularity on the bodies and laminæ. The ribs are not appreciably altered.

The clavicles show enlarged pores for blood-vessels, but nothing that is characteristic. On the scapulæ the posterior part of the spines, especially the left, is somewhat thick and irregular, but otherwise there is no appreciable change. The right humerus is considerably thickened at its lower end by periosteal new bone formation, most marked in front. There the surface, besides being irregular, is in places eroded as if the new material were being absorbed again. The periosteal crust diminishes from below upwards, and does not quite reach the deltoid attachment on the outer side, although it can be traced further up on the back. The rest of the bone shows only an enlargement of vascular pores. The left humerus has only a very slight periosteal crust, about the middle of the posterior surface. Elsewhere the surface of the bone is rough from enlargement of the vascular pores. The right ulna shows only some periosteal crusts on the outer side of the upper end, and enlargement of vascular pores at other places, but the left ulna shows a very distinct thickening all round the shaft, about the middle. The changes at the upper end correspond to those on the right side. The radii show an increased size of vascular apertures and some periosteal new bone formation on the upper part of the outer surface. On the right side, in addition, there

is a slight deposit of periosteal bone, just above the front of the lower articular surfaces. The bones of the hand show no definite change.

The pelvis shows no characteristic change. On both sides the vascular channels seem unusually well marked, and on the right side, the outer surface of the ilium is slightly roughened by periosteal formation. The right femur is thickened from the lower end up to about the middle, but more behind than in front. The surface of the thickening has all the appearance of new periosteal formation, and is more irregular on the back than in front. One vascular channel on the back is enlarged into a distinct aperture. The shaft of the left femur is thickened about the middle, mostly on the inner side, but also slightly all round. A periosteal crust can be traced downwards to the knee-joint, especially on the inner side. On both tibiæ the vascular pores are enlarged, and some new bone has been formed on the shin surface and at the attachment of the tibialis anticus muscle. Both fibulæ show slight periosteal roughness at the muscular attachments, and an enlargement of vascular pores. The bones of the foot show no appreciable change. G. C. 3391.

6. 283. Syphilitic Disease of the Clavicle.—A left clavicle—macerated, illustrating the above.

The greater part of the bone has been affected. About the middle the anterior and upper parts have been attacked, and an excavation has been formed, in the base of which are fragments of necrotic-looking bone partially separated. This excavation is surrounded by new periosteal bone, which passes round to the under surface, and fades off at either side. The outer end of the bone is irregular and partially absorbed, and near it new periosteal bone has been formed. G. C. 993.

6. 284. Syphilitic Disease of the Sternum.—Sternum—macerated, illustrating the above.

The bone is increased in weight, and its surfaces are encrusted with new periosteal bone, probably from syphilis.

B. C. 1. 5. M. 12.

6. 285. Syphilitic Enlargement of the Humerus.—Section of a right humerus—injected with vermilion, partially cleaned and in spirit.

The specimen is from a patient who was supposed to have had syphilis.

There is thickening of the shaft at the back of the lower end, and patches of vascularity and crusts of new periosteal bone are scattered up and down. B. C. 1. 5. M. 1.

6. 286. Syphilitic Enlargement of the Humerus.—Right humerus—macerated, illustrating the above.

The bone is increased in weight, and is thickened on its inner and posterior surfaces, especially at the junction of the lower and middle thirds, where a large node has been formed. The prominent part of the node is formed of irregular projections, which get smaller towards the margin. The head and neck show little change. B. C. 1. 5. M. 89.

6. 287. Syphilitic Enlargement of the Humerus.—Upper portion of left humerus from the same patient as the last—macerated, illustrating the above.

The disease on this side is more advanced. A node, somewhat similar to the last, but at a lower level, has been present. This node, however, has contained a necrosed piece of bone, still adherent but in process of separation, and having cloacæ leading to it. A section has been made through one of the cloacæ to show the structure. The whole of the upper part of the shaft is encrusted with new periosteal bone, except here and there where the original surface is seen through it.

B. C. 1. 5. M. 90.

6. 288. Syphilitic Enlargement of the Humerus.—Right humerus—macerated, illustrating the above.

The bone is increased in weight and thickened at its lower end. The surface of the thickened part is extremely rough from projecting processes of periosteal bone. The parts most affected correspond to the places of attachment of the triceps and brachialis anticus muscles. B. C. 1. 5. M. 88.

6. 289. Syphilitic Enlargement of the Humerus.—Right humerus—macerated, illustrating the above.

The lower end is thickened, especially upon the posterior and outer surfaces. In several places an erosion of the new bone penetrates also into the old, as if an ulcer or sinus in the soft parts had extended downwards into the bone.

B. C. 1. 5. M. 91.

6. 290. Syphilitic Enlargement of the Radius and Ulna.—Right radius and ulna, from the same patient as No. 6. 285—injected with vermilion, surface cleaned, and in spirit, illustrating the above.

Considerable irregular periosteal growth is seen on the radius, especially on the back near the two ends.

On the upper end of the ulna, especially at the outer and back parts, there are patches of vascularity and crusts of new periosteal bone. B. C. 1. 5. M. 1.

6. 291. Syphilitic Enlargement of the Ulna.—Right ulna—macerated, illustrating the above.

The upper end is greatly enlarged and irregular. Its posterior surface is also eroded and rarified, as if it had formed the base of an ulcer. The lower end of the bone and the articular surfaces are unchanged. B. C. 1. 5. M. 92.

6. 292. Syphilitic Enlargement of the Ulna.—Shaft and upper end of a left ulna—macerated, illustrating the above.

The shaft is irregularly thickened from below upwards by periosteal formation, and its surface is nodular and porous. The disease has extended between the two sigmoid cavities of the upper articular surface. B. C. I. 5. M. 95.

6. 293. Syphilitic Enlargement of Radius and Ulna.—Right radius and ulna (head wanting)—illustrating the above.

The Haddington Parish Church, or "The Lamp of Lothian," as it was formerly called, was originally built in the eleventh century. In 1423 a new floor was laid down, and other alterations were made, and it is recorded that there were fifteen altars in the church placed near the bases of the eight pillars, of which four run along each side. In 1811 a wooden floor was put in, galleries erected, and the church reseated. In 1891 the church was renovated, and among other alterations a concrete floor was laid down. In preparing the ground for the cement, about eighteen inches of a loose sandy soil was taken away from below the former wooden floor, and it was in this soil that the bones were found. There was no trace of coffins of any kind; most of the bones lay near the pillars, and therefore near where the altars formerly stood.

Although the interior of the church is known to have been used occasionally for burial purposes up to the end of the eighteenth century, it seems probable that the bones found round the pillars had been interred there before 1423, and therefore are not unlikely to have been those of monks.

These bones formed part of the only complete skeleton found. The shaft of the ulna, as in the two former specimens, is gradually thickened from the lower end upwards, and the surface, although uneven, is comparatively smooth, as if the disease had been long quiescent.

The shaft of the radius is thickened, chiefly about the middle. Its surface resembles that of the ulna. The lower

articular surfaces are altered in shape as if from arthritis deformans. G. C. 3346.

Presented by W. R. MARTINE, M.B., C.M., Haddington.

6. 294. Syphilitic Enlargement of the Radius.—Right radius —macerated, illustrating the above.

There is an irregular thickening of the lower end of the bone, beginning a little above the articular surface, and extending up to the middle. The thickened part is very irregular, partly from eating out of its surface, and partly from the formation of new bone. It has the appearance of a node, which had become the seat of destructive changes. W. C. G. 31.

6. 295. Congenital Syphilitic Enlargement of the Radius. —Plaster cast of the right forearm of a boy, showing a swelling over the upper part of the radius.

The boy had "Hutchinson's teeth," and ulcerations of the palate and nose. There was a clear history of syphilis in his parents. G. C. 3282.

6. 296. Syphilitic Enlargement of the Femur.—Upper half of a right femur—macerated, illustrating the above.

There are irregular thickenings all over the shaft. These have been at one or two places the seat of destructive changes. The bone is unduly heavy: B. C. I. 5. M. 57.

6. 297. Syphilitic Enlargement of the Femur.—Left femur —macerated, illustrating the above.

On the inner and outer surfaces above there are nodular thickenings, which are continuous with one another on the

lower third. The surface of the inner of the two nodes is the more porous and irregular. B. C. 1. 5. M. 56.

6. 298. Syphilitic Enlargement of the Femur.—Posterior half of the upper end of a left femur—macerated, illustrating the above.

On the shaft there is an irregular thickening, which, as the section shows, is chiefly of cancellated tissue. The medullary cavity seems somewhat enlarged. W. C. G. 21. a.

6. 299. Syphilitic Enlargement of the Femur.—Sections of the upper end of the shaft of a right femur—macerated, illustrating the above.

There is great thickening of the surface, especially on the inner side. The section shows that the enlargement has a compact outer wall and a cancellated interior. The original compact layer of the shaft of the bone is still traceable, although about the middle of the enlargement it has been opened out. W. C. G. 21. a.

6. 300. Syphilitic Enlargement of the Femur.—Lower end of a left femur in section—macerated, illustrating the above.

The bone is thickened all round, a little way above the condyles. The section shows that the new bone is much condensed behind, but less so in front, and that the medullary cavity at the seat of the thickening has been occupied by newly formed cancellated tissue. B. C. 1. 5. M. 5.

6. 301. Syphilitic Enlargement of the Femur.—Anterior half of a left femur—macerated, illustrating the above.

A large node extends along the inner surface in the form of a diffused periosteal thickening, somewhat uneven on the surface. The interior of the node is compact and continuous with the shaft above, but elsewhere it is more or less cancellous where it lies on the shaft. W. C. G. 21. a.

6. 302. Syphilitic Enlargement of the Femur.—Posterior half of the lower end of a left femur—macerated, illustrating the above.

The surface is irregular, from a deposit of condensed bone upon the compact shell. Near the lower end the process has been recent, and a film of new periosteal bone on the surface of the old thickening is clearly distinguishable at the inner part of the section. W. C. G. 21. a.

6. 303. Syphilitic Enlargement of the Femur.—Posterior half of the middle three-fourths of a left femur—macerated, illustrating the above.

A large node is seen in section on the inner surface. It is condensed, except about the middle, where the tissue is more porous. The line of the original compact shell can, however, still be traced. W. C. G. 21. a.

6. 304. Syphilitic Enlargement of the Femur.—Sections of upper end of a right femur—macerated, illustrating the above.

The surface is irregular from the formation of new densely compact bone, continuous with the original compact tissue, and indistinguishable from it. This condensation often goes by the name of sclerosis. The medullary cavity is somewhat contracted. F. P. C. 393 and 394.

Presented by Professor JOHN THOMSON.

6. 305. Syphilitic Enlargement of the Femur.—Section of a femur—macerated, illustrating the above.

The surface is irregular and the interior greatly condensed or sclerosed. F. P. C. 408.

Presented by Professor JOHN THOMSON.

6. 306. Syphilitic Enlargement of the Femur.—Right femur, lower end in section—macerated, illustrating the above.

There are two enlargements of the bone, one on the upper half, the other on the lower half of the shaft, but they are disconnected at the middle. The lower is the larger. Although its surface is rough, the bone forming it is much condensed. B. C. 1. 5. M. 52.

6. 307. Syphilitic Enlargement of the Femur.—Left femur, from the same subject as the last—macerated, illustrating the above.

The bone is increased in weight and is thickened, especially towards its lower end. The thickening extends all round the bone at the junction of the lower and middle thirds. Above the first thickening, and separated from it by a small area of almost unchanged bony surface, there is another, a little below the small trochanter. The surface of the upper thickening is porous, but that of the lower one is smooth. The apertures for blood-vessels are greatly enlarged above the lower articular surface. B. C. 1. 5. M. 54.

6. 308. Syphilitic Enlargement of the Femur.—Right femur—macerated, illustrating the above.

The bone is condensed and heavy, and the surface irregularly thickened. A small bony spicule projects upwards from the linea aspera, where it branches to pass to the inner condyle. F. P. C. 636.

Presented by Professor JOHN THOMSON.

6. 309. Syphilitic Enlargement of the Femur.—Right femur —macerated, illustrating the above.

The bone is heavy, and the surface shows at various places diffused thickenings, with marks of increased vascularity. The neck is short, and the head, owing to absorption, is below the level of the trochanter. The margins of the articular surface are prolonged and overhang the neck—changes often seen in arthritis deformans. Sir Charles Bell notes: "The sinking of the head of the bone and distortion of the neck have been consequent on disease. An appearance is presented in the specimen which has been described by some as a reunited fracture within the capsular ligament."

Probably syphilis has altered the shaft, and arthritis deformans the upper end. B. C. I. 1. M. 22. a.

6. 310. Syphilitic Enlargement of the Tibia.——Right tibia of an adult, from the same syphilitic subject as that from which Nos. 6. 306 and 6. 307 were taken—macerated, illustrating the above.

There is an enlargement on the outer surface, three or four inches from the lower end, and a periosteal crust extends on the shin surface as high as the upper third. An elongated patch of new periosteal bone is seen on the outer surface, at the attachment of the tibialis anticus. The bone is somewhat increased in weight. B. C. I. 5. M. 53.

6. 311. Syphilitic Enlargement of the Tibia.—Left tibia, from the same subject as the last—macerated, illustrating the above.

There are periosteal crusts on the shin surface, and also at the upper part of the outer and posterior surfaces. The bone is also somewhat increased in weight. B. C. I. 5. M. 55.

6. 312. Syphilitic Enlargement of the Tibia.—Right tibia—macerated, illustrating the above.

There is a comparatively new periosteal node or enlargement on the posterior and inner surfaces, near the upper end, with marks of increased vascularity on the outer surface lower down. The bone is somewhat increased in weight.

B. C. I. 5. M. 72.

6. 313. Syphilitic Enlargement of the Tibia.—Left tibia—macerated, illustrating the above.

There are two distinct nodes on the shaft,—one small, on the anterior ridge two inches below the tubercle, and the other, much longer and larger, on the posterior and inner surfaces, about the middle. A slight periosteal crust is seen just beside the outer tuberosity, on the outer surface. The bone is increased in weight. W. C. G. 40.

6. 314. Syphilitic Enlargement of the Tibia.—Lower half of a right tibia—macerated, illustrating the above.

A large periosteal node occupies the greater part of the inner surface, and extends to the back and outside. Its surface is porous, as if the process had been still active. The bone is somewhat increased in weight. B. C. I. 5. M. 76.

6. 315. Syphilitic Enlargement of the Tibia.—Left tibia—macerated, illustrating the above.

The posterior and outer surfaces are thickened and roughened from new periosteal formation. The lower end of the bone and the front and upper parts of the shin surface are comparatively unchanged. This condition resembles the nodes seen in previous specimens, only more diffused. The bone is a little increased in weight. B. C. I. 5. M. 71.

6. 316. Syphilitic Enlargement of the Tibia.—Left tibia—macerated, illustrating the above.

The anterior and lateral parts of the bone are diffusely thickened, except near the upper and lower ends. There are also one or two thickenings on the posterior surface. The surface of the main thickening is rough and porous, except over an area on the inner side, about five inches from the lower end, where it is smooth. B. C. 1. 5. M. 74.

6. 317. Syphilitic Enlargement of the Tibia.—Left tibia—macerated, illustrating the above.

There is one periosteal node on the outer and inner surfaces about the middle and another smaller one on the posterior surface higher up. The surfaces of the nodes are smooth as if the active process had long ceased. The inner surface at the lower end shows marks of increased vascularity, and the bone as a whole is increased in weight.

B. C. 1. 5. M. 68.

6. 318. Syphilitic Enlargement of the Tibia.—Right tibia of a strong man—macerated, illustrating the above.

This specimen was from the same skeleton as No. 6. 293, which see.

There are nodes on the posterior surface, and a smaller one on the crest, as well as a periosteal crust on the shin.

There are several marks of pick and spade on the bone, which were produced when it was being dug up.

G. C. 3276.

Presented by W. R. Martine, M.B., C.M.

6. 319. Syphilitic Enlargement of the Tibia.—Left tibia from the same skeleton as the last—macerated, illustrating the above.

There are diffuse periosteal thickenings along the posterior and inner surfaces, and slightly also on the outer surface near the lower end. The surface of the nodes is at some places rough and at others smooth, as if a disease of long standing were still progressing at places. There is a mark of the pick near the lower end. G. C. 3277.

Presented by W. R. MARTINE, M.B., C.M.

6. 320. Syphilitic Enlargement of the Tibia.—Shaft of the right tibia of what must have been a strong man, illustrating the above.

It was also found beneath the floor in Haddington Parish Church. (See No. 6. 293.)

There has been such extensive periosteal new formation that very little of the surface of the bone is unchanged. There are marks of the pick at various places. G. C. 3278.

Presented by W. R. MARTINE, M.B., C.M.

6. 321. Syphilitic Enlargement of the Tibia.—Shaft and lower end of a left tibia, apparently of a middle-aged man or a tall woman.

The bone was found beneath the floor in Haddington Parish Church. (See No. 6. 293.)

There is a smooth node about the middle of the shin surface. The pick has marked the bone above the lower end. G. C. 3279.

Presented by W. R. MARTINE, M.B., C.M.

6. 322. Syphilitic Enlargement of the Tibia.—Left tibia, apparently of a woman—macerated, illustrating the above.

There are irregular nodes on the surface of the greater part of the shaft, especially at the upper end. B. C. 1. 5. M. 75.

6. 323. Syphilitic Enlargement of the Tibia.—Left tibia—macerated, illustrating the above.

About the middle there is a considerable thickening, the surface of which is smooth behind, but irregular and porous on the inner side. B. C. 1. 5. M. 70.

6. 324. Syphilitic Enlargement of the Tibia.—Middle third of a left tibia—macerated, illustrating the above.

There is a considerable periosteal thickening on the inner and posterior aspects, and its surface is rough and porous all over. G. C. 1006.

6. 325. Syphilitic Enlargement of the Tibia.—Left tibia—macerated, illustrating the above.

A churchyard specimen.

The shaft is encrusted with periosteal bone all over, but especially along the back, and near the lower end of the inner surface, where a node has been developed. The surface of the new bone is partially destroyed, probably from its having been buried. B. C. 1. 5. M. 49.

6. 326. Syphilitic Enlargement of the Tibia.—Left tibia—macerated, illustrating the above.

The whole of the bone from the upper third to within an inch of the lower articular surface is thickened by periosteal deposit, especially on the anterior and lateral aspects. The surface of the enlargement is unusually irregular, and at places has been rarefied and eroded. The bone is increased in weight. G. C. 1005.

6. 327. Syphilitic Enlargement of Tibia and Fibula.—Lower halves of a right tibia and fibula—macerated, illustrating the above.

The leg was amputated.

The fibula is for the most part covered with a nodular crust of new bone, the surface of which is rough, especially near the lower end. The tibia, several inches above its lower end, shows a similar crust, especially at the back, but towards the middle of the shaft the changes are comparatively slight.

F. P. C. 449.

Presented by JOHN CAMPBELL, F.R.C.S.E.

6. 328. Syphilitic Enlargement of the Bones of the Leg.—Left tibia and fibula—macerated, illustrating the above.

The tibia has a periosteal crust over nearly the whole of its surface, especially towards the lower end, where the bone is manifestly thickened. The surface of the thickening is smooth on the inner aspect and rough on the outer. The fibula shows irregular periosteal deposits over the greater part of its surfaces. The bones are increased in weight. B. C. 1. 5. M. 73.

6. 329. Syphilitic Enlargement of the Fibula.—Portion of a fibula—macerated, illustrating the above.

The shaft is thickened for about three inches by a fusiform node-like development of bone upon its surface.

F. P. C. 459.

6. 330. Syphilitic Enlargement of the Fibula.—Right fibula —macerated, illustrating the above.

The lower half of the bone is uniformly thickened all round, and its surface is rough and porous, with patches of rarefaction and erosion here and there. B. C. 1. 5. M. 83.

6. 331. Syphilitic Enlargement of the Fibula.—Shaft of a left fibula—macerated, illustrating the above.

There is a periosteal node near the lower end, which is porous and eroded on its outer surface. B. C. I. 5. M. 85.

6. 332. **Syphilitic (?) Enlargement of the Fibula.**—Lower end of a left fibula—macerated.

There is much new periosteal formation upon its inner surface, with rarefaction at one place. B. C. I. 5. M. 84.

6. 333. **Syphilitic (?) Enlargement of the Fibula.**—Left fibula —macerated.

There is much irregular periosteal formation on its anterior and outer surfaces, near the middle third. W. C. G. 16.

6. 334. **Syphilitic (?) Enlargement of the Fibula.**—Left fibula —macerated, showing great irregularity and enlargement at the malleolus.

This may have been possibly from syphilis, possibly from tubercular and septic disease of the ankle. B. C. II. M. 42.

6. 335. **Congenital (?) Syphilitic Enlargement of the Tibia.** —Section of a right tibia, injected with carmine and in spirit.

"J. E., æt. 22, was admitted to the Royal Infirmary under Dr P. H. MacLaren's care, suffering from necrosis of the bones of the forearm, diagnosed to be syphilitic in character. For this condition the forearm was amputated through the upper third on 19th April 1887. The wound healed well. Shortly afterwards at the upper part of the tibia a gumma formed, which softened and burst, leaving an ulcer with bare bone at its base. Another similar ulcer soon formed at the lower end of the tibia. For these the patient was again admitted to the Royal Infirmary in June 1887. Both ulcers continued discharging, in spite of treatment, and without any indication of the separation of the necrosis. As the continued discharge was weakening the patient, the leg was amputated through the lower third of the thigh by Dr MacLaren on 8th November

1887. Although no history of syphilis, congenital or acquired, could be obtained, the syphilitic nature of the disease was diagnosed from the course of the symptoms, and it was considered to be probably congenital."

The whole of the bone is enlarged by the formation of cancellated tissue. At the upper end there is a section of the necrosis, and its white, non-vascular character is brought out in contrast with the surrounding injected bone. Round the surface of the necrosis there was an ulcer of the skin, part of which has been left. Part, however, has been removed, to show patches of caseous material, which had been present in the periosteum outside the base of the ulcer. A certain amount of separation of the necrosis had occurred, but not enough to loosen it. Several white caseous deposits are seen in the interior of the bone, above the necrosis, and one or two are seen near the anterior surface at the lower end. On the soft parts, near the lower end, a large gumma is shown, caseous and non-vascular, and surrounded by an area of increased vascularity. In front of this a small sinus in the skin has been left, and the soft parts removed near it, to show that it led down to a gummatous deposit in the periosteum. G. C. 2770.

Presented by P. H. MacLaren, F.R.C.S.E.

6. 336. Syphilitic Enlargement of the Tibia.—Upper end of a right tibia—macerated.

There is a deposit of periosteal new bone on the surface. The bone is increased in weight. F. P. C. 446.

6. 337. Congenital Syphilitic Nodes on the Lower Ends of the Tibia and Fibula.—Plaster cast of the left leg and foot of the boy from whom the cast No. 6. 295 was taken.

The cast shows a swelling due to enlargement of the lower ends of the tibia and fibula, just above the ankle.

G. C. 3283.

7. *Inflammation of Bone due to Syphilis, complicated by Sepsis.*

6. 338. Syphilitic (?) Disease of the Tibia and Invasion by an Ulcer.—Portion of a right tibia—macerated, illustrating the above.

Nearly all round the bone there is a thickening, which, to judge from the rarefaction on its inner surface, has probably formed the base of an ulcer. B. C. 1. 5. M. 6.

6. 339. Syphilitic (?) Disease of the Tibia and Invasion by an Ulcer.—Lower end of the right tibia of a young man—macerated. The epiphysis has not yet united.

There is an enlargement on the inner aspect near the lower end, and the surface there is rarefied and depressed, as if it had formed the base of a deepening ulcer of the soft parts.

This specimen has been considered syphilitic from the node-like character of the swelling, the comparative youth of the patient, and the absence of such surrounding periosteal new formation as is commonly associated with ordinary ulceration. B. C. 1. 5. M. 65.

6. 340. Syphilitic Disease of the Tibia, with Invasion by an Ulcer.—Portion of a left tibia—macerated, illustrating the above.

On the shin surface there is a node, which is excavated and rarefied as if it had formed the floor of an extending ulcer of the soft parts. Some new periosteal bone has been formed up and down the shaft near the ulcer. G. C. 1007.

6. 341. Syphilitic Disease of the Tibia, with Invasion by an Ulcer.—Right tibia of a tall young man, with the epiphysis not yet united—macerated, illustrating the above.

The lower part of the tibia shows a node-like thickening which extends nearly all round. The thickening rises abruptly from the surrounding bone above. Its surface is rough and porous, as if it had formed the base of an extending ulcer. One or two smaller nodes may be seen above the large one. The bone is unusually light. The grounds for believing this to be a case of syphilis are the presence of the nodes, and of so large an ulcer in so comparatively young a person. (See No. 6. 339.) G. C. 1179.

Presented by Professor JAMES RUSSELL.

6. 342. Syphilitic Disease of the Tibia, probably complicated by Ulcers.—Left tibia of an adult in section—macerated, illustrating the above.

On the inner or shin surface there is a smooth node-like swelling above the middle, and lower down two abrupt nodes, which may have lain beneath ulcers of the skin. The upper of these two is the smaller and has a porous surface. The other larger one has its surface partly smooth and partly porous. The outer and posterior surfaces of the bone are rough and irregular. The medullary cavity is occupied by cancellous bone beneath the upper node, and at other places shows irregular dilations. These in old syphilitic bones usually contain fat, not pus or caseous matter, as might possibly be supposed. The tissue of the bone is on the whole lightened, and the compact outer layer has for the most part been replaced by cancellous tissue.

B. C. 1. 5. M. 78, 79.

6. 343. Syphilitic (Mercurial?) Disease of the Tibia, with Necrosis.—Right tibia and fibula—macerated, illustrating the above.

This was formerly described as "tibia and fibula of the right leg of a person affected with syphilis. The disease continued for twelve years, during the greater portion of which time mercury was taken."

A large and very irregular piece of bone on the shin surface has probably been exposed on the floor of an ulcer. It is deeply entrenched all round except at the upper end. An aperture on the oblique ridge behind exposes the necrosed bone at the back, but the deep attachments are otherwise still quite firm. The general surface of the shaft is very rough from new periosteal formation. At the lower end the inner and posterior surfaces are greatly eroded, and show apparently a necrosis of the interior, which has extended to the outer part of the articular surface. The fibula is unchanged, with the exception of a new periosteal deposit on the surfaces adjacent to the tibia.

F. P. C. 447.

Presented by Professor JOHN THOMSON.

6. 344. Syphilitic (Mercurial?) Disease of the Tibia, with Necrosis.—Left tibia and fibula from the same patient as the last—macerated, illustrating the above.

There are two partially separated necroses—one just above the middle, distinctly entrenched round but still adherent; the other above the lower end, much rougher on its surface, and less distinctly entrenched below, where it merges into a carious condition of the surrounding bone. The rest of the tibia is thickened by new periosteal bone, with a porous surface. The lower articular surface of the tibia is affected apparently by necrosis of the bone over an area corresponding to that on the right side but less advanced. The upper articular surface is unchanged. This fibula, like the right one, is comparatively unchanged.

F. P. C. 448.

Presented by Professor JOHN THOMSON.

6. 345. Syphilitic (Mercurial?) Disease of the Tibia, with Necrosis.—A right tibia in section—macerated, illustrating the above.

A large mass of rough and irregular bone near the middle of the shin surface has apparently been a sequestrum in process of separation, and has no doubt lain exposed on the floor of an ulcer. Below this the bone is porous, as if it had formed the base of an extending ulcer, and below this again there is a raised mass of periosteal bone, which is penetrated here and there by roughened apertures. The rest of the surface of the tibia is rough from new periosteal bone formation. The section of the bone shows a small central necrosis near the upper end. Above this piece there is an excavation of the head of the tibia, and below it the greater part of the medullary cavity is occupied by cancellated tissue. G. C. 1179. a.

Presented by Professor JAMES RUSSELL.

8. *Combined Effects of Syphilis and Rickets.*

6. 346. Syphilis and Rickets of the Femur.—Left femur of an adult—macerated, illustrating the above.

The specimen shows a rickety bend, with syphilitic nodes on the surface. The bend is chiefly seen at the upper end, and is an exaggeration of the normal curve, such as is usually seen in rickets. The nodes occupy the front and outer part of the shaft, and bear a close resemblance to the syphilitic nodes seen in previous specimens. B. C. 1. 5. M. 51.

6. 347. Syphilis and Rickets of the Femur.—Right femur—macerated, illustrating the above.

The normal bend of the shaft is exaggerated above, and a node has apparently been developed about the same place.

This somewhat resembles the previous specimen, and may be considered to have been a slight case of rickets to which syphilis has been superadded. F. P. C. 603.

Presented by Professor JOHN THOMSON.

9. *Inflammation of Bone due to Actino-Mycosis.*

6. 348. Actino-Mycosis of Bone.—Section of the jaw of an ox, illustrating the above.

From a slaughter-house in Berlin, where this disease is said to be comparatively common in summer.

The bone has been irregularly enlarged, and is occupied by numerous cavities of varying size containing a caseous-looking material. The bone between these cavities is firm and dense.

G. C. 3387.

Presented by Edgar Willet, F.R.C.S. Eng.

10. *Inflammation of Bone due to the Mycetoma Fungus.*

6. 349. Mycetoma or Fungus Foot of India—Black Variety.—Foot of a Hindoo, aged 40, in section—mounted in spirit, to illustrate the above.

"1877, *July* 14.—Admitted on the 8th inst. for the above, which is of ten years' duration. Before the disease manifested itself used to work in the fields, the soil of which was not black cotton, but the ordinary red soil of the country. Had no guinea-worm ; not pricked by a thorn.

"The foot is now enormously swollen, especially in its posterior two-thirds. The anterior part is narrow and contracted, due to the three last toes being turned upwards, their plantar surfaces looking directly outwards and forwards, caused by his resting the foot on the outer border, and the pressure gradually raising the toes upward. There is a largish tumour on the sole, at the base of the great toe, the under surface of which is ulcerated. Characteristic tubercles are formed all over the foot, and even up the leg as far as the upper third. The leg is slightly swollen. There is a good deal of pain, attended with a burning sensation in the affected limb. The tubercles discharge sago-like granules of a black kind. His health is fair."

The interior of the bones, as well as the soft parts, are occupied by characteristic black granules of varying size. These lie in spaces which formerly contained fluid, and which are surrounded by more or less complete fibrous capsules.

G. C. 2511.

Presented by Surgeon Tyrrell, H.M. Madras Army.

6. 350. Mycetoma or Fungus Foot of India—Yellow Variety.—Foot of a Hindoo, aged 40, in section—mounted in spirit, to illustrate the above.

"1877, *July 7th.*—Admitted into Hospital on the 21st June. States that about fourteen years ago a small movable tumour appeared over the joint of the right great toe. It gradually enlarged, and suddenly one day he found a small opening on its upper surface, which, on being squeezed, discharged blood and matter, and reddish grains like granules of soda. Soon after, others of the same character appeared all over the dorsal aspect of the sole of the foot. When these button-like tubercles were enlarging, pain was severe, and as soon as they burst and discharged their contents he obtained relief, which was absent so long as the tubercles were empty; but as they began to enlarge, the pain also appeared, and gradually increased in severity with the enlargement. Never worked in black cotton soil, was never pricked with a thorn, and has not suffered from guinea-worm."

The foot, especially towards the front, has been enormously swollen, and the surface, especially of the dorsum, is studded over with rounded tubercles of varying size. The interior of the front of the foot has been converted into a large cavity which contained a clear fluid, and in which the metatarsal bones are lying macerated and loose, their substance being rarefied and more or less absorbed. The soft parts are tunnelled in various directions by channels leading from the interior to the tubercles on the surface, and containing in many places characteristic yellow granules. G. C. 2509.

Presented by Surgeon TYRRELL, H.M. Madras Army.

6. 351. Mycetoma or Fungus Foot of India—Yellow Variety.—Foot of a Hindoo, aged 45, in section—mounted in spirit, illustrating the above.

"1877, *April 20th.*—A professional beggar admitted yesterday for the above, which is of ten years' duration. It appears that at the beginning he noticed a white patch on the sole of the foot, which was caused by the pressure of the stilts which he used in his professional capacity. After some years the patch presented a series of fissures, from which a glutinous discharge exuded, and which adhered to his sandals.

"After the application of the flesh of squirrels as a poultice, the fissures enlarged, and from them white sago-like grains were often discharged. Slowly the border of the foot began to enlarge, and at the seat of the enlargement the tubercles or button-like projections so character-

istic of mycetoma appeared one after the other, and from the apices of each, through the minute opening situated thereon, these grain-like masses were discharged.

"A year ago the enlargement became very marked, and since then has become enlarged, attended with pain. After the discharge of the granules, the pain, which increases until then, becomes less, and he gets relief until the tubercles are again ready to discharge.

"He is anxious to have the foot removed.

"Has never been in black cotton soil; has never had guinea worm. Some ten years previous to the appearance of the white patch, he was pricked by a thorn in the sole, near the middle of the bases of the toes. After that he was laid up for a month. Through the opening a slough was discharged, and the granulations were exulcerant, which were destroyed by some caustic application.

"He was only able to walk three months after the receipt of the injury."

In this specimen the front of the foot has been distended even more than in the previous case, and the bones have been more extensively affected. The tubercles on the surface are fewer and smaller. There are few tunnels to be seen, and granules only here and there. G. C. 2510.

Presented by Surgeon TYRRELL, H.M. Madras Army.

6. 352. **Mycetoma or Fungus Foot of India.**—Bones of the foot and lower end of the tibia and fibula of a native, aged 30—macerated, illustrating the above.

Amputation was performed through the leg and the patient recovered.

The os calcis and astragalus are marked by numerous circular pits and erosions on their surface, some of these passing deeply into the bone, and in some places honeycombing it. At the margins of the posterior surface of the os calcis there are numerous projecting portions of new periosteal bone. The other tarsal bones have been almost entirely destroyed, and are represented in most cases by an imperfect shell containing some atrophied cancellous tissue. The bases of the metatarsal bones are in a similar condition, and in some cases the shafts also. The tibia and fibula have been attacked in a similar way

near their lower ends, but higher up new periosteal bone has been developed. G. C. 3394.

Presented by JAMES E. T. AITCHISON, M.D., Civil Surgeon, India.

6. 353. Mycetoma or Fungus Foot of India.—Bones of a right foot—macerated, illustrating the above.

Patient was aged 35. Syme's amputation was successfully performed.

The bones chiefly affected are the cuboid, the cuneiforms, and the four outer metatarsals; the latter are very greatly reduced in size, and are marked by numerous erosions.

G. C. 3395.

Presented by JAMES E. T. AITCHISON, M.D., Civil Surgeon, India.

IV. TUMOURS OF BONE.

A. *Cartilaginous Tumours—ranging from the slowly-growing simple forms whose tissues are well developed, to the rapidly-growing malignant forms whose tissues are more or less embryonic.*

6. 354. Chondroma of the Humerus.—Section of a righ humerus and of a cartilaginous tumour growing from it—in spirit.

The patient, a man aged 40, had noticed the tumour growing below and external to the shoulder-joint for ten years before he consulted Mr Chavasse. It had grown steadily, and by its increase had caused pain in his neck and forearm. During the last eighteen months the growth had been more rapid, and the surface had become irregular. Three months before the operation, softened patches had appeared at the lower part. One of these had given way, and an oily fluid had at first drained from it, but shortly before the operation free hæmorrhage, apparently venous, had occurred from it also. "Up to the last the affected arm, with the aid of a sling, was used for driving, and there was no deterioration of the patient's general health."

The upper limb, including the scapula and part of the clavicle, was removed by Mr Chavasse, according to Berger's method. The patient made an excellent recovery, and some years afterwards was known to be in excellent health.

The weight of the specimen after the operation was twenty-one pounds, of which about eighteen pounds would belong to the tumour. The circumference of the tumour at the widest part was twenty-eight inches. Its consistence was firm and elastic, except at one or two spots, where it had become cystic. The outline was nodular, and several large veins were seen on the surface. In cutting the tumour calcareous nodules were met with, so that the knife and saw had to be used alternately.

The tumour consists of nodules of cartilage varying from the size of a pea to that of a walnut. The smaller nodules, when fresh, were translucent and firm like the substance of the crystalline lens. The large ones were yellowish and somewhat opaque, and in some cases had softened at the centre. Round the nodules there was a delicate stroma of connective tissue, carrying blood-vessels. From these, in some places, lime salts have been deposited, so as to form a calcareous shell round the nodules. Here and there, where several calcareous nodules have united, the interior is transformed into cancellous bone. The outer part of the shaft of the humerus is thickened and sclerosed at the upper end, but the interior is unaffected. The tumour seems to have started from the thickened part, and to have partially surrounded the humerus.

Microscopically, the tumour was found to consist of hyaline cartilage without special features.

For further particulars of this case see "Successful removal of the entire upper extremity for Osteo-chondroma, by Thomas F. Chavasse, M.D.," etc., in vol. lxxiii. of the "Medico-Chirurgical Transactions of London." G. C. 3128.

Presented by T. F. Chavasse, F.R.C.S.E.

6. 355. Chondroma of the Humerus.—Portion of the same tumour—macerated, to show how the calcareous matter has been deposited as a shell round the nodules. G. C. 3177.

Presented by T. F. Chavasse, F.R.C.S.E.

6. 356. Chondroma of the Humerus.—Glycerine and gelatine cast of same tumour as it was after removal.

The relation of the tumour to the arm is well brought out, as well as the nodular character of the surface of the tumour.

G. C. 3127.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 357. Chondroma of the Humerus.—Photograph, before and after the operation, of the patient from whom the foregoing tumour was removed. Taken from Mr Chavasse's paper. (See No. 6. 354.)

G. C. 3399.

6. 358. Chondroma of the Humerus.—Wax cast of a left humerus and attached tumour, illustrating the above.

Six years before the operation the patient had occasional pains in the shoulder, and in six months afterwards he observed on the forepart of the shoulder a firm swelling, which appeared to be seated on the bone. Three years afterwards he fell and broke the affected humerus about the middle, but it united without displacement. "But the morbid growth advanced more rapidly after this injury, and his uneasy sensations kept pace with its progress. He said that what chiefly distressed him latterly was a feeling of weight and oppression which never ceased, and was particularly severe during the night. He had no other complaint, and seemed to be sound in all other respects."

Before the operation the following description was drawn up :—"It had a very broad base, which completely filled the axilla, and seemed to grow out from the side of the thorax. The shoulder-joint did not admit of any motion, but the arm moved freely along with the scapula. The head of the humerus seemed to be the centre of the swelling, which extended from it in every direction, terminating about half-way from the elbow, and approaching within two inches of the sternum. The clavicle and spine of the scapula could be traced nearly, but not quite, to their junction. The consistence of the tumour was extremely firm, feeling in some parts as if it were composed of bone, and in others of fibro-cartilage. The surface appeared in general pretty equal, but when examined more carefully was found to be irregularly nodulated. The colour of the integuments was not altered."

The tumour was removed, along with the glenoid cavity and the

acromion and coracoid processes of the scapula and part of the clavicle. The patient made an excellent recovery. The tumour weighed twelve pounds. It was macerated, but all the parts fell to pieces.

This has probably been a case like the previous one, and the nodular character of the cast still further confirms this view.

G. C. 1789.

Presented by JAMES SYME, F.R.C.S.E.

6. 359. Chondroma of the Humerus.—Photograph of Mr Syme's illustration of the patient from whom the above tumour was removed. G. C. 3400.

6. 360. Chondroma (?) of the Humerus.—Plaster cast of a large tumour, apparently of the upper end of a left humerus, to illustrate the above.

From its nodular character and position, it has probably been a tumour similar to the two previous ones.

F. P. C. 2920.

6. 361. Chondroma of Thumb and Forefinger.—Sections of cartilaginous tumours growing from the metacarpal bone of a thumb and the first phalanx of a forefinger—in spirit.

The patient, when a boy, had his hand crushed, and afterwards the tumours formed gradually.

The sections show that the tumours are composed of numerous small lobules of hyaline cartilage, each apparently surrounded by a very delicate stroma. Some of the nodules seem to have been softening. The surface of each tumour is formed by a thin layer of bone continuous with the bone from which the tumour has grown. Imperfect and irregular appearances of septa are seen here and there passing inwards from the interior of the bony shell. B. C. 1. 6. M. 32.

6. 362. Chondroma of Little Finger.—Metacarpal bone and

first phalanx of the little finger of a left hand—macerated, illustrating the above.

An expanded shell attached to each bone is evidently the remains of a cartilaginous tumour. That on the metacarpal bone is the more complete, and has arisen from the back of the bone, at its phalangeal end. It forms nearly a complete shell, but is perforated and deficient here and there. The interior has, attached to the wall, numerous irregular processes or septa, which before maceration must have separated cartilaginous nodules. The expanded part on the phalanx has been partly sawn away, but it has originally been less complete than that on the metacarpal bone. The interior of the phalanx is quite exposed.

This specimen was formerly described as a case of "spina ventosa." G. C. 205.

6. 363. Chondroma of Little Finger.—Phalanges of what seems to be a little finger, apparently of a young person, with chondroma arising from the first phalanx—in spirit.

Amputated at St. George's Hospital, and presented to Mr Wilson by Mr Brodie in 1806.

An extension from the back of the first phalanx passes for a short distance on to the surface of the tumour, the interior of which is composed of small lobules of hyaline cartilage, now rendered very opaque by the spirit.

Formerly described as tumour of first phalanx of thumb. W. C. G. 32. a.

6. 364. Chondroma of Fingers.—Plaster cast of a left hand, apparently of a woman, illustrating the above.

There are tumours upon all the phalanges and upon some of the metacarpal bones. The largest one, which is on the middle finger, has attained the size of a small orange. Those on the index finger are next in size, and extend nearly to the tip. The third finger is least affected, but shows distinct

enlargements. The first, second, and fifth metacarpal bones have had small growths attached to them. G. C. 2269.

6. 365. Chondro-sarcoma of the Thumb.—Section of a thumb—in spirit—showing a chondro-sarcomatous tumour growing from the first phalanx.

The man, aged 51, was admitted to the Royal Infirmary, Edinburgh, in December 1891. His family history was good, and he had previously been quite healthy and temperate.

"Seven years ago," while holding a horse with a rope, the rope got twisted round his thumb and hurt it. The thumb was sore for several days after this, but did not swell. This was in spring; during the summer it felt stiff, and in the following winter the first phalanx swelled up from what was considered to be rheumatism. During the following winter it again became at times sore and swollen. The swelling was red, and the veins over it were distended. It came and went more frequently, and seemed to be worse on exposure to cold. It soon continued to be painful even when there was no swelling. This intermittent swelling continued for four years, when he noticed a small lump attached to the outer side of the first phalanx. The lump was bluish and soft; it was very painful, and he thought it was going to form matter. It, however, continued to grow without coming to a head. Eighteen months ago it was opened, and only blood came out, and last August it was opened again, with the same result. The thumb was amputated and the patient shortly afterwards went home.

After section the tumour was found to have originated in the front of the first phalanx, and to have expanded the bone for a short distance laterally, but there was no shell of the bone over the main piece of the tumour. The joints at each end of the phalanx were not affected. The tumour mass was of firm consistence, except towards the margins, where it was soft and reddish, hæmorrhages having taken place into the tissue at these parts. The main mass of the tumour presented a gelatinous appearance, with a network of dense white material, apparently cartilage of firmer consistence than the rest, and with calcareous nodules interspersed.

Microscopic examination showed it to be chondro-sarcoma (round-celled) with some myxomatous degeneration.

G. C. 3358.

Presented by JOHN DUNCAN, F.R.C.S.E., December 1891.

6. 366. Chondro-Sarcoma of the Thumb.—Plaster cast of the hand from which the previous specimen was taken. The size and position of the tumour is well shown. G. C. 3357.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 367. Chondro-Sarcoma of Scapula and Chondromata of Fingers and Humerus.—Right arm, with scapula and part of clavicle amputated for enormous chondro-sarcoma of the scapula—in spirit.

The patient was a gentleman, aged 33. From infancy the joints of both arms were noted as "peculiar." The shoulder, elbow, and finger joints of his right arm were supposed to have been "put out" by some injury, of which, however, no history was obtainable from his mother. During childhood and boyhood the finger-joints steadily got more "peculiar," enlarging gradually till, when he was 18 years of age, the growths formed a decided inconvenience, particularly those on the right hand, all the fingers of which were affected. On the left hand, the middle, ring, and little fingers only had growths. As the tumour of the right middle finger hindered him from writing, the finger was removed by Professor Syme. The patient was at this time fully engaged in hard office work. In 1870, when about 20 years of age, he went to Southern India, and remained there for thirteen years, enjoying, until the growth of the great tumour, perfect health. He was able to write, ride, and play lawn tennis. The growths on his fingers had meanwhile only slightly increased up to about January 1883 (the year of the operation). He then began to feel pain in the right shoulder, and was treated for neuralgia. The pain got worse; the shoulder began to swell; his clothes required altering, and finally he had to keep his arm in a sling outside of his clothes altogether. The pain centred over the bicipital groove and was very much aggravated by the least pressure.

By April 1883 he had gradually become invalided, the pain getting steadily worse. He walked with difficulty, till in July he was forced to lie up. After a month in bed he could only stand with help. In August he was carried to Madras for further advice. At this time he could straighten his legs, but the growth was increasing rapidly. At Madras he was advised to return home, and did so, being carried into his bunk in October, and never leaving it during a voyage of thirty days. Being a tall man, his legs were kept permanently bent up, thus acquiring the position described in "present condition." On arriving in Edinburgh he saw Dr Gillespie. Dr Patrick Heron Watson was shortly afterwards called in consultation, but thought that any operation was inadvisable, because the patient's general health was in such an unsatisfactory condition.

By 17th December his general condition and blood had considerably improved under treatment, and Dr Watson decided to remove the arm, scapula, outer third of the clavicle along with the tumour, as the only possible means of affording relief to the patient's intense sufferings. He was in a state of constant acute suffering, and could not retain the arm for five minutes in one position. The pain prevented the possibility of sleep for more than three minutes at a time, and he had not slept an hour for many weeks. He had quite a cachetic appearance.

At this time the tumour of the right scapula rose as a great hump above the line of his shoulder. It was incorporated with the scapula and adjacent parts. It was firm in consistence in some places, and soft and almost fluctuating in others. There were also multiple growths, like small apples and firm in consistence, on the metacarpal and phalangeal bones of both hands.

The knees were rigidly semi-flexed, and the patient had scarcely any power over his lower limbs, the muscles of which were much atrophied. The thighs and calves felt brawny.

Dr Watson operated on 17th December 1883, and the wound healed without a bad symptom.

Although he made a capital recovery as to wound, he only slowly recovered the use of his legs, by the use of rubbing, the "battery," and extension at night to straighten the knees. On 6th April 1884 his general health was good, but as he was still unable to use his legs, much the same treatment was continued. On 20th June 1884 a photograph of the cicatrix was taken. He could then walk with help, and his health was good. During July and August he walked fairly well, and went to the country. In September, on his return, he did not look so well, his colour being dusky. In November 1884 Dr Burn Murdoch was called to attend him for pains in his chest on the right side, with shortness of breath and cough. Some pleuritic rubbing was heard, and a copious effusion into both right and left pleural cavities was detected. He died shortly afterwards, in November 1884, from obstruction to respiration and increasing weakness.

Autopsy.—The chest (both sides) was full of fluid, and both lungs were studded over with hard and semi-hard nodular masses. One or two nodules of a similar nature were found on the internal surface of the ribs. (Permission had been given to examine the chest only.)

The fingers are disfigured by numerous simple cartilaginous tumours of the usual character. A section of one has been made to show its structure. The firm lobulated cartilaginous substance, interspersed with calcareous and osseous nodules, is characteristic of the slow-growing simple chondroma. A somewhat similar tumour can be seen growing from the outer condyle of the humerus, as well as from the adjacent portions of the bone. The tumour on the scapula has been sliced in one or two places

to show its character. It is formed of large masses, surrounded by fibrous tissue. The interior of these masses is broken up into small portions, apparently by the softening of the matrix, so that the tumour has an irregular, honeycombed appearance, which is a great contrast to the firm texture of the chondroma of the fingers, placed in juxtaposition to it. Microscopically this tumour consists of a substance resembling embryonic cartilage, showing numerous spindle cells, with a relatively small proportion of inter-cellular substance. G. C. 2726.

Presented by PATRICK HERON WATSON, F.R.C.S.E.

6. 368. Chondro-Sarcoma of Scapula and Chondromata of Fingers and Humerus.—Photograph of the cicatrix about six months after the removal of the above tumour. Taken 20th June 1884. G. C. 3401.

Presented by T. BURN MURDOCH, M.D.

6. 369. Chondro-Sarcoma in Lung.—Portion of lung from previous case—in spirit.

Nodules of chondro-sarcoma are scattered through the lung substance. The nodules on section show a naked-eye appearance similar to that seen in the large tumour of the scapula. Microscopically also the characters are the same as those of the original tumour. G. C. 3184.

Presented by T. M. BURN MURDOCH, M.D.

6. 370. Chondro-Sarcoma of Humerus.—Section of what had been an enormous tumour—in spirit, illustrating the above.

John Bell called it an "osteo-sarcoma arising from the humerus."

The following history of the case is taken from John Bell's "Principles of Surgery," vol. iii. part i. page 82 :—

"Alexander Macdonald, a Highlander, from Fort Augustus—a tall and handsome lad, passing six feet in height, and uncommonly athletic—was put to the Perth Academy for his education in writing, book-keeping, and such other parts of learning as might qualify him for a counting-house. It was intended to send him to America, a clerk to the North-West Company, in the fur trade. In running violently at tennis, in the Academy green, he fell and hurt his shoulder. It was such a bruise as often happens from a fall, without entailing the slightest ill consequence beyond the first pain and swelling ; the skin was blackened by the bruise and the joint was sprained ; he had excessive pains along the whole arm for twenty-four hours ; but it vanished gradually. He imagined himself well ; he had recovered everything but the strength of his arm ; but after the violence of the pain (which lasted no more than twenty-four hours) was gone, such weakness remained, that though from his great strength he could lift perpendicularly such weights as others could not move, yet he could never raise his arm to his head.

"I was at pains to question his father, a respectable old man, concerning the part which received the injury, and he clearly and decidedly affirmed that it was not the shoulder-joint, but the middle of the bone of the arm that received the shock. It was along the whole of the arm that he felt the pain, and could distinguish the marks of the bruise. The pain had, after its first violence, totally ceased, as if the part had sustained no permanent injury, and he believed himself well. It was exactly at the end of a month that the pain returned and fixed in the joint, with a very distressing sense of weakness, so that he could not at all raise his arm ; if he meant to put on his hat with it, he had to raise it with the other hand, and when thus raised, if he lowered it again without support, the moment it fell unsupported below the level, it descended like lead. Still, he could lift perpendicularly a very great weight, but from this second period of pain we must date the disease. The whole arm swelled, but especially about the shoulder. His cries and shrieks were wild and melancholy. Living in a remote part of the Highlands, it is natural for the father to express himself in the following words, which he invariably uses when I question him in regard to the degree of pain : 'Sir, there was no hour of the night nor day in which you could not hear his wild cries miles off.' He represented the particular pain by saying it seemed as if he had been bored with hot irons ; and his cries were so unceasing, as well as so piercing, that 'though they lived in a very long house they had no sleep from this time forward.'

"That such had been his condition no one could doubt who saw him before his death, for the swelling kept equal pace with these dreadful sufferings. At first the arm seemed chiefly to swell from the shoulder-joint ; gradually the whole arm swelled, and the forearm and hand dwindled. His body, before lusty and strong, was wasted with the agony and want of rest. Yet even at this time, when the arm was monstrously swelled, and before it was entirely oppressed, or the forearm wasted, he could

lift as heavy a weight with the left arm as with the right, and even to the last stage, that in which I saw him, his hand was strong to grasp. In the first four months the upper part of the arm had so increased in size that the prominent part exceeded the size of his head, but now, at the end of nine months, it greatly exceeds in size his emaciated body.

"When I went to receive this poor lad, I found him lying deep in the hold of a small sloop, in which he had been transported from Inverness, laid on a coarse mattress, and bolstered up against the shelving side of the vessel; and when the clothes were lifted I solemnly declare that I hardly knew at first what it was that I saw—which was the tumour and which his body, or how to connect in imagination the one with the other. He lay in an inclined and irregular posture, extremely languid, and hardly able to articulate, his head inclining to one side. The tumour, when first exposed by lifting the clothes, might be mistaken for his body in respect of size, it was of a suitable bulk, and when the lean, yellow, emaciated thorax was next exposed, the tumour seemed so much to exceed it in size, with a shining surface and brilliant colour, that at first I was more confounded than shocked, so impossible was it, in the first moments, to consider of it as a tumour, or to see its relation to the arm. The forearm was dwindled and shrunk, and projected from the tumour at a strange and unnatural distance from the shoulder. The veins were swelled, like these of a horse's belly; large fungous tumours, as big as oranges, projected in a group from the outside of the arm at the place where, about two months before, a large abscess had burst; and such was the fœtor of the matter running from under these fungi and the languor of this poor emaciated creature, that I had no thought for the present but how to get him conveyed alive to town. After a few days, when he was somewhat recovered from the fatigues of the voyage, I proceeded to write down the history, and examine the actual state of this tumour. I found it throughout solid, consisting chiefly of bone, little cartilaginous, hardly in any part elastic or yielding, and discharging matter, not from any superficial abscess, but apparently from the centre of this enormous mass. I had every reason to believe that the bone and the joint, which certainly were neither broken nor dislocated, had been generally injured, not merely by the shock but by the bruise; that the parts nearest the bone, and connected with it by the periosteum, had been bruised and inflamed; that the extreme pain for the first twenty-four hours indicated only the violence of the immediate injury, but the slow vascular action which succeeded at the distance of a month proved how deeply the circulation of the bone was affected, and caused that osseous secretion which generated this prodigious shell of bone, while the shaft of the shoulder-bone, from the periosteum of which this callus had been secreted, was in part destroyed by an ulcerating process within. That the ulceration, deep-seated, not only in the bone but in the joint, occasioned those excruciating tortures which were announced by wild and desperate cries night and day; that the matter, bursting at last through every obstacle, had made its

way through that ulcerated part of the surface which is studded with the fungous excrescences represented in the drawing.

"This bursting out of the matter brought relief from the pain, and he now lay in a state of extreme languor, moaning and slumbering. You found it painful even to question him, he was so feeble; he fell, after a few broken answers, into a slumber of mere debility, and closed his eyes as exhausted; and while I took the sketch of his posture, and of the proportions of this prodigious tumour, he slumbered continually. His extreme weakness precluded every practical experiment, and left for our discussion the speculative question only: 'In a case so deplorable and hopeless, what should we have done at an earlier stage, when the patient's strength was more entire, and youth and vigour (for he was but 21 years of age) on his side?'

"Here, for the first time, I felt that a bony tumour might, by advancing to the trunk of the body, preclude amputation as entirely as aneurism of the subclavian artery! That the question here to be resolved was not whether we might dare to amputate at the shoulder-joint—the question was of amputating the scapula also, and along with it a tumour exceeding in size even the trunk of the body! and the accident mentioned by Cheselden (an accident which has often happened since) of Wood, the miller, whose arm, scapula and all, was rudely and suddenly torn from his body, could not but come into our recollection. There was hardly left us even a choice to exercise our discretion and skill upon; for, from the state of the veins—large, tortuous, and already ulcerating, and so numerous as to give a livid colour to almost all the surface of the tumour—it was plain that he was in daily peril of hæmorrhage, and that this was at no remote period, certainly within a few weeks, to put a period to his life! Could there then be a question whether to wait in fear of that hæmorrhage which was assuredly to end in death; or to risk by operating that hæmorrhage by which he might be saved alive? For my part, I had not the shadow of a doubt. What should determine us in any deplorable case to do desperate things? Surely the possibility of safety through operation, the certainty of death. I saw it possible, by tying first the subclavian artery, the root of all the circumflex arteries of the shoulder and scapula, to prevent any alarming degree of hæmorrhage; by sawing across the outer end of the clavicle to get command of the scapula, and turn it back, as easily as the flap from an ordinary stump; to tie, when it was cut, the arteria transversalis humeri, and certainly to separate the whole without immediate death. But had this been an enterprise as certainly fatal as the Cæsarian section itself, still it gave some chance for life. Confident in the justness of this reasoning, moral and physical, I should have urged him to this awful trial, and devoted myself to the task; but he was sunk too low for any trial, and to be regarded only as an object of charitable care. He died in the Royal Infirmary of hæmorrhage, about three weeks after his admission, and these are the notes of the dissection.

"*Dissection—July 13th*, 1806.—Having divided the integuments,

which were extremely thin, we found, on attempting to cleanse the tumour from one extremity to the other, that it was of a substance much resembling callus; in many places it was so firm and solid that after trying in vain to divide it with a strong knife, we were obliged to betake ourselves to the common amputation saw.

"The cells of this bony tumour were everywhere filled with a matter resembling thick cheese; the tumour itself, from its great size, and the entire appearance of the os humeri, seemed only to be attached to that bone; but upon a more minute examination was plainly a production from its substance. The shoulder-bone could be traced through the whole tumour; but enlarged, spongy, and ulcerated. The upper part of the scapula, the acromion process, and the outer end of the clavicle could, during life, be plainly distinguished to be enlarged, and to form part of the tumour; and upon dissection, all the bones forming the shoulder-joint were found to be deeply diseased. The upper and most bulky part of the tumour seemed to proceed as much from these as from the os humeri, and the joint was completely anchylosed."

This portion of the tumour is evidently cartilaginous. The nodules in most places are distinct, but over extensive areas they have been softened and broken down. Calcareous deposits are scattered throughout the substance. John Bell's description of the tumour does not correspond exactly to that of a cartilaginous tumour, when he speaks of matter "resembling thick cheese," unless he means "of the consistence of thick cheese." The reference, however, in the Catalogue description of this specimen to the above case could be to no other than that quoted. The clinical history as to pain and rapid growth is also strikingly like Dr Watson's case of chondro-sarcoma. (See No. 6. 367.)

G. C. 1270.

Presented by Professor John Thomson.

6. 371. Chondro-Sarcoma of Humerus.—Photograph of the illustration of the above case in John Bell's "Principles of Surgery," vol. iii. part i., to illustrate the relative size of the tumour, and the appearance of the patient during life.

G. C. 3586.

6. 372. Chondro-Sarcoma (?) of Humerus.—Plaster cast—coated with wax—of left upper extremity, showing growth of

an enormous fungating tumour of the upper part of the humerus.

Although this is described in the Bell Catalogue merely as the cast of a fungus tumour of the humerus, it has probably been taken from the previous case. It resembles the drawing by John Bell very closely, and corresponds to his description.

B. C. 1. 6. M. 3.

B. *Osseous and Connective-Tissue Tumours—ranging from the slowly-growing simple forms whose tissues are well developed, to the rapidly-growing malignant forms whose tissues are more or less embryonic.*

(*a.*) From the Periosteum and Bone.

6. 373. Ossification of Muscles of the Thigh ("Myositis Ossificans").—Upper end of a right femur and adjacent portion of pelvis—macerated, illustrating the above.

From the margin of the obdurator membrane a sharp spicule of bone, one and a half inches in length, points directly to the insertion of the obturator externus muscle, and has evidently developed the ossification of some of its fibres. Below it, attached to the ascending ramus of the ischium, is a large irregular mass of bone which must have occupied the position of part of the obturator externus and adductor magnus muscles. The outer side of the tuber ischii is nodular. The spine of the ischium is irregular and jagged. The remaining portions of the ischium and as much of the ilium as is present are rough on the surface.

On the back of the upper end of the femur there is a mass of rough spongy bone corresponding to the position of the quadratus femoris muscle; and below the small trochanter an irregular mass of similarly spongy bone arises from the inner surface of the shaft, and occupies a space from above downwards of about four inches, representing, apparently, ossification in the vastus internus and adjacent adductor muscles. This mass of bone is perforated by large sinuses, apparently the position of blood-

vessels. It may be noted that the position of the tendinous attachments about the great trochanter shows little or no tendency to ossification, and, while the new masses of bone seem to have run into the substance of some of the muscles, other muscles in the neighbourhood—for instance, the iliacus—seem to have escaped entirely. The whole bone is very heavy.

G. C. 3414.

Presented by T. M. Burn Murdoch, M.D.

6. 374. Ossification in Adductor Magnus Muscle ("Myositis Ossificans").—Plaster cast of a left femur in the Barclay Collection, illustrating the above.

Attached to the femur there is a large mass, corresponding to the position of the adductor magnus muscle. The new bone was cancellous in texture.

G. C. 3292.

6. 375. Ossification in Vastus Internus Muscle ("Myositis Ossificans").—Right femur, lower end injured—macerated, illustrating the above.

About the middle of the inner and anterior surface of the shaft there is a projecting piece of bone, which has apparently been an ossification in the vastus internus muscle.

G. C. 1868.

Presented by J. A. Robertson, F.R.C.S.E., 1837.

6. 376. Ossification in Crureus Muscle ("Myositis Ossificans").—Left femur, lower end missing—macerated, illustrating the above.

A piece of bone projects from the anterior and outer surface of the bone, about the middle, and has apparently been an ossification in the crureus muscle.

G. C. 1869.

See also diseases of muscle, series 9.

Presented by J. A. Robertson, F.R.C.S.E., 1837.

6. 377. Distortion of Bones by Multiple Exostosis.—Femur, tibia, and fibula of a right leg; with part of femur, tibia, and fibula of the opposite side—macerated, illustrating the above.

The articular ends of the shafts are greatly distorted by exostoses, and the bones of the legs are fused.

On the right side the femur has large irregular exostoses projecting all round the neck, especially behind and below, where they have obliterated the small trochanter. The great trochanter is not much changed, but below it a large irregular mass of bone projects outwards, and while gradually tailing off into the linea aspera below, runs into the mass at the lesser trochanter in front. These masses of bone are composed of cancellated tissue, with more or less enlarged spaces. The articular surface of the head is rough and nodular below the impression for the ligamentum teres, and the hip-joint has apparently been anchylosed. The lower end shows numerous projecting spines and ridges, which are largest on the outside. They do not follow the direction of any muscular fibres, and the tip in most cases is exposed, probably from having been covered with cartilage in the recent state. The tibia shows at the inner and posterior parts of the head numerous knobby and spinous projections similar to those on the lower end of the femur. A bridge of bone unites the tibia with the fibula about an inch below the level of the tubercle. The lower end of the tibia shows several projecting spines and knobs, and is fused with the lower end of the fibula. The shaft of the tibia shows scarcely any change. There is no ossification in the interosseous membrane, except one small spine on the tibia. The fibula is wanting at its upper end, where it should have articulated with the tibia, but below that place it is fused with it. Except at one or two spots at either extremity, where there are spinous projections, the shaft of the fibula is normal.

On the left side the lower end of the femur has irregular spinous projections similar to those on the right side. The tibia and fibula are affected similarly, but more extensively than those of the right side. The upper end of the tibia is

bent towards the fibula, and is fused with it at a place corresponding to the fusion on the right side. The connecting bridge of bone is thrown out into numerous large irregular processes, the tips of which are deficient, as if they had been covered by cartilage when recent. At one spot, on the outer side, what seems to be the remains of an articulation between the tibia and fibula is perceptible. The rest of the upper end of the tibia is little altered, except at the posterior and inner sides, where the same spinous processes are seen. The lower ends of both bones are fused into one common mass, and the bone seems to have been broadened out. A few spinous projections are seen at the lower end of both bones. As on the other side, ossification has not occurred in the interosseous membrane.

(For an account of this condition, see "Arch. für Klin. Chir.," Band 41, p. 420.) B. C. I. 6. M. 20 to 23.

6. 378. Exostosis of the Tibia and Fibula.—Upper end of a right tibia and fibula—macerated, illustrating the above.

There is an anchylosis of the two bones a little below their usual place of joining, which is very like the condition found in the previous specimens. It may be considered to be due to a bony outgrowth from each bone towards the other.

B. C. II. M. 34.

6. 379. Exostosis of Clavicle.—Left clavicle of an adult—macerated, illustrating the above.

The bone is stunted in growth. A large irregular mass projecting downwards from the outer end is continuous with the articular surface, which is thus much enlarged. Some irregular nodules project downwards from near the inner end, and seem in the recent state to have been capped with cartilage. The normal curves of the bone have been straightened.

B. C. I. 6. M. 16.

6. 380. Exostoses of the Scapula.—Right scapula—macerated, illustrating the above.

The main projection is from the sub-scapular fossa ; others arise from the infra-spinatus fossa and at the superior angle. They are like ossifications in the corresponding muscles.

B. C. 1. 6. M. 16.

6. 381. Exostoses of Humerus.—Right humerus—macerated, illustrating the above.

A long irregular piece of bone projects forwards in the position of the bicipital groove, which it has replaced. Another irregular piece projects inwards about three inches below the head, and several smaller projections are seen on the back of the bone just below the surgical neck. The deltoid impression is also somewhat prominent. The head of the bone and the tuberosities are small and ill-formed, and the muscular impressions are comparatively faint. The articular surface has lost its smoothness. This appearance of the head and tuberosities makes it probable that the shoulder-joint had been disused for many years. The lower end of the bone seems normal.

This bone may have belonged to the same patient as the previous scapula, but there is no history to that effect.

B. C. 1. 6. M. 17.

6. 382. Exostosis of Humerus.—Left humerus—macerated, illustrating the above.

A large and somewhat nodular mass of bone projects backwards and outwards from the upper half of the shaft. This long outgrowth is for the most part in the position of the outer head of the triceps, or between that and the deltoid. The muscular impressions on the upper end are fairly well marked.

B. C. 1. 6. M. 19.

6. 383. Exostosis of Humerus.—Left humerus—macerated, illustrating the above.

Opposite the attachment of the deltoid a projection of bone rises from the inner side, somewhat abruptly below, but more gradually above, when it passes into the line of the neck. The whole bone is curved inwards. The muscular impressions on the tuberosities are faint, and the articular surface of the head is slightly roughened, as if the shoulder-joint had been anchylosed. G. C. 3416.

Presented by MACDONALD BROWN, F.R.C.S.E.

6. 384. Exostosis of Ulna and Anchylosis to Radius, which is distorted.—Right radius and ulna of "a Dutch dwarf"—macerated, illustrating the above.

The lower end of the ulna has been greatly expanded and has become fused with the radius. A section of the expanded part shows that it is occupied by numerous irregular partitions. The outer surface is nodular and irregular, resembling the upper end of the femur in specimen 6. 377. The shaft of the radius is flattened laterally and curved forwards, and its lower end is fused with the expanded part of the ulna. The lower articular surface of the radius looks obliquely backwards and inwards. At the upper end of both bones the bony ridges are exaggerated, and the insertions of the brachialis anticus and biceps are unusually prominent. These changes were formerly ascribed to rickets, but the condition seems more allied to those of irregular exostosis seen in some of the previous specimens. B. C. 1. 6. M. 18.

6. 385. Mixed Tumour of Bone.—Three sections of a small tumour (one macerated)—in spirit, illustrating the above.

It was attached by a narrow pedicle to the clavicle of an adult.

It is composed of cancellous bone (resembling that of the previous tumour), loose cartilage, and fat. G. C. 3361.

Presented by A. G. MILLER, F.R.C.S.

6. 386. Exostosis of Femur.—Section of the lower end of a left femur—macerated, illustrating the above.

An exostosis of cancellous tissue arises from the front of the shaft near its lower end. G. C. 3417.

6. 387. Exostosis of Rib.—Rib, said to be the sixth—macerated, illustrating the above.

A large nodular exostosis projects downwards from the lower border, near the sternal end of the shaft.

B. C. 1. 6. M. 15.

6. 388. Exostosis of Rib, probably inflammatory.—Portions of two ribs, macerated—illustrating the above.

From the body of Catherine F., who died in 1832, aged 70. Between 30 and 40 years before death, her left breast had been removed by the late John Bell, in the Royal Infirmary, Edinburgh, and subsequently part of a rib had also been excised.

Most probably, therefore, the bar of bone between the two ribs has been the result of previous irritation, and thus is not a true exostosis. The bar was jointed to the upper of the two ribs by a ligament and joint. G. C. 1298.

Presented by Dr Coldstream.

6. 389. Exostosis below Great Toe-Nail.—Section of a distal phalanx—in spirit, illustrating the above.

From a girl aged 16.

This is a common form of exostosis; it lifts up the nail, and causes irritation, often mistaken for "ingrowing toe-nail." G. C. 2122.

Presented by Benjamin Bell, F.R.C.S.E., 1840.

6. 390. Exostosis below Great Toe-Nail.—Other half of the same exostosis—macerated, illustrating the above. G. C. 2123.

Presented by Benjamin Bell, F.R.C.S.E., 1840.

6. 391. Ivory Exostosis of Nasal Cavity.—Section of an irregular mass of exceedingly dense bone, from the right nasal cavity of a man aged about 40.

For many years the patient had suffered from inconvenience and discharge from his right nostril. Some polypi had been removed, and about a year before this mass was taken away it had been recognised as probably a rinolith. After one or two unsuccessful attempts to remove it while the patient was under chloroform, this mass was finally extracted, but not until the anterior nares had been freely exposed, and their margins enlarged with gouge forceps. During this operation an attempt was made to divide this mass, and the marks of the saw are shown in the specimen. Had the saw-cut been completed, the removal would have been easier.

The patient died of septic meningitis about a week after the operation, and at the *post-mortem* examination it was found that the mass had pressed through the cribriform plate of the ethmoid bone, and had entered the cranial cavity. On this account the operation had the more easily set up the fatal meningitis.

The section shows the dense ivory-like character of the growth. On microscopic examination it was found to be composed of very dense bone.

It had no doubt originally grown from the ethmoid, but it must have afterwards necrosed, for it was quite loose within its cavity at the time of the operation. G. C. 3273.

Presented by A. G. Miller, F.R.C.S.E.

6. 392. Ivory Exostosis of Nasal Cavity.—Plaster cast of the previous specimen before it was sawn up. G. C. 3274.

6. 393. Very large Fibro-Osseous Tumour of the Lower End of Femur.—Section of the lower half of a femur with the above tumour growing from it—in spirit.

The patient, a woman, aged 33, was admitted to Professor Chiene's ward in October 1890.

Five or six years before admission, she thinks she sustained a sprain of the knee, and ever since then the knee has been swollen, getting gradually larger, but never painful. The patient has never been laid up, and only had difficulty in walking for the first time two months before

admission. About that time one lump appeared in the popliteal space, and another over the inner tuberosity of the tibia. These two have grown rapidly, but painlessly, the one over the femur the more slowly. On admission the patient had no pain in the swellings, and could walk with the aid of a stick. She had some numbness and pain in the toes an foot, and the leg was rather cold. The right knee measured twenty-three inches in circumference at the popliteal space. There were thre special swellings—the largest and uppermost, surrounding the lower third of the femur, seemed to grow from the epiphyseal line. The middle one filled up the popliteal space, and the lowest was on the anterior and inner aspect of the leg. These swellings were smooth and rounded; the skin was drawn tightly round them, but not involved.

After removal by amputation, on 15th October, the tumour was sawn up, and found to be capsulated, smooth, and lobulated. The lower tumour had a watered silk appearance, like the section of a fibrous tumour. Two separate nodules of tumour substance were found in the gastro-cnemius, and both contained bone. The main mass was found fused with the femur, and was fibrous externally and osseous internally. The popliteal portion was cartilaginous, and showed a transition between fibrous tissue and cartilage. The tumour was considered an "osteo-chondro-fibroma," as it was composed chiefly of bone, fibrous tissue, and a little cartilage.

The specimen on one side has been stained with logwood, which shows the difference between the osseous and the fibrous parts. The cancellated tissue at the lower end of the femur is replaced by condensed bone, like that in the substance of the femur, but the outline of the shaft is still at places perceptible. Some of the new bone forming the tumour is extremely hard and dense. G. C. 3378.

Presented by Professor JOHN CHIENE.

6. 394. Fibro-Osseous Tumour of Lower End of Femur.—Portion of same tumour—macerated, to show its bony structure.

The section shows the bone to be somewhat porous after the removal of the fibrous tissue. In many places it is composed of plates lying at varying distances from one another, but seldom showing the usual characteristics of cancellated tissue.

The outer surface of the bone is rough, in most places owing to the intervals between the plates of bone, but at others, from needle-like radiating processes, resembling those seen in an ossifying sarcoma. G. C. 3379.

Presented by Professor JOHN CHIENE.

6. 395. Fibro-Osseous Tumour of Lower End of Femur.—Portions of bone from the previous specimen, which were developed in the fibrous tissue, but separate from the main mass. Their characteristics are similar.

The tumour illustrated by this and the two preceding specimens may be classed as simple in the slowness of its growth and high development of most of its tissue, including a large proportion of bone, but as "malignant" in the steady increase of its size, in having disconnected centres of ossification, as well as in the arrangement of its bony plates. It should be stated also that while most of the fibrous tissue which formed it was fully developed, there were more rapidly growing parts which were softer in consistence and more embryonic in character. G. C. 3379. a.

Presented by Professor JOHN CHIENE.

6. 396. Exostosis of Fibula.—Plaster cast of the left foot and ankle of a girl, aged nine, illustrating the above.

She was admitted to the Royal Infirmary, Edinburgh, on 5th August 1859, under the care of Dr. Gillespie.

The tumour had grown for four years, "gradually encroaching on the tibia and towards the ankle."

"The exostosis was broadest at its attachment to the bone. It had caused the absorption for a considerable portion of the anterior and outer portion of the tibia." G. C. 2673.

Presented by J. D. GILLESPIE, F.R.C.S.E.

6.397. Exostosis of the Fibula.—Plaster cast of the same foot after removal of the tumour.

There is thickening all round the ankle. G. C. 2674.

Presented by J. D. GILLESPIE, F.R.C.S.E.

Osteo-Sarcomata, *i.e.* Tumours probably similar to the previous ones, but more rapidly growing.

6. 398. Slow-growing Osteo-Sarcoma of the Tibia.—Upper end of the right tibia of a young person—macerated, illustrating the above.

A very large osseous tumour has grown from the upper end of the bone. The only recognisable part of the shaft at the upper end is a small portion on the posterior surface. The surface is thrown out into numerous irregular processes, of a somewhat friable bone, directed outwards from the shaft.

From the amount of bone formed this tumour has probably been of comparatively slow growth. B. C. I. 6. M. 1.

6. 399. Slow-growing Osteo-Sarcoma of the Tibia.—Wax model representing the previous specimen when fresh.

One side shows the appearance of the tumour when the skin was dissected off; the other shows the appearance of the bone when newly macerated. B. C. I. 6. M. 2.

6. 400. Osteo-Sarcoma of Skull.—Greater part of the vault of a skull—macerated, illustrating the above.

A churchyard preparation from the north of Scotland.

"The patient was a herd-girl, aged 26. About eight years before her death she exhibited symptoms of dementia, which gradually advanced to a maniacal state. She suffered from fearful headaches. A growth appeared on the side of her head, on the right parietal bone, and gradually increased in size. Suppuration took place in it, and opened externally."

The whole top of the skull is covered with—in fact, is converted into—a very extensive growth of new bone in the

form of plates and processes, projecting outwards from the surface. At places the skull has been penetrated. A limited amount of the new bone formation is seen in the interior. G. C. 2705.

Presented by Dr JOHNSTON, of Jamaica.

6. 401. Osteo-Sarcoma of Skull.—Portion of a skull, greatly altered by the growth of the above.

From a subject in the Dissecting-Rooms. "A tumour was found fixed in this part of the cranium."

The original texture of the skull is replaced by a series of long plates and tubes projecting on both aspects.

W. C. G. 38.

6. 402. Osteo-Sarcoma of Femur and Knee-joint.—Section of the lower end of a femur, epiphyses wanting—macerated, illustrating the above.

A mass of irregular bone surrounds the lower end of the bone, and the section shows much condensation of the interior.

The friable nature of the new bone, its irregularity, and its being composed of numerous minute spicules shooting outwards from the surface, are the characters for which this tumour has been placed among osteo-sarcomata, but it has been placed early in the series, from the comparatively large amount of bone formed. G. C. 3418.

6. 403. Osteo-Sarcoma of Femur and Knee-joint.—Section of the lower end of a femur—macerated, illustrating the above.

The specimen shows a mass of irregular bone growing from the surface, with condensation of the interior.

At the upper part new periosteal bone can be seen in parallel ridges, different in character from that seen on the

surface of the tumour. This upper growth is beyond the tumour, and is almost certainly due to the irritation of its presence. It closely resembles the growth due to pus-forming organisms, and may be considered as "irritative." It may be seen near most specimens of periosteal sarcoma.

This specimen is essentially similar to the last, except that there is less bone. W. C. G. 32.

6. 404. Osteo-Sarcoma of Femur and Knee-joint.—Lower end of a left femur—macerated, illustrating the above.

There is an extensive formation of new bone round the lower end down to the articular surface, and filling up the inter-condyloid notch. The bone is composed of delicate plates and processes, extending outwards from the surface of the shaft, and more or less closely packed together at different places. Above the new growth for some distance the surface of the bone is rarefied, and beyond that there is the crust of new periosteal bone noted in the previous specimen. G. C. 320.

Presented by Dr Stenhouse and Professor W. R. Turner.

6. 405. Cystic Osteo-Sarcoma of Femur. — Sections of the anterior part of the lower end of a right femur — macerated, illustrating the above.

The tumour occupied the whole of the thigh from the knee to the hip-joint, and was cystic in places.

This specimen shows the characteristic development of delicate plates of bone running outwards from the surface with various degrees of obliquity. The disease does not seem to have reached the synovial cavity of the knee-joint.

G. C. 314. b.

Presented by George Bell, F.R.C.S.E.

6. 406. Cystic Osteo-Sarcoma of Femur. — Portion of the shaft of the same femur as the last — macerated, illustrating the above.

There is a remarkable development of delicate osseous plates growing from the shaft. These plates are themselves composed of finer processes and plates of bone. The open nature of the larger plates may be associated with the cystic character of the tumour. G. C. 314. a., 321.

Presented by GEORGE BELL, F.R.C.S.E.

6. 407. Cystic Osteo-Sarcoma of Femur. — Portion of the soft part of the tumour from the previous case—in spirit.

It appears to be composed of a soft, fibrous material containing numerous cysts. G. C. 314. c.

6. 408. Osteo-Sarcoma of Fibula.—Left fibula of a young person —macerated, illustrating the above.

Surrounding its upper end there is a mass of new bone, delicate in structure, and composed of numerous fine plates and spicules. Some of these run horizontally outwards, while others pass vertically, parallel with the long axis of the bone.

B. C. 1. 6. M. 10.

6. 409. Osteo-Sarcoma of the Lower End of the Femur. —Section of the lower end of a right femur—in spirit, illustrating the above.

The patient was an athletic and powerful man, about 35 years of age. For some months before amputation was performed, he had felt obscure pains about the knee. These were thought to be due to varicose veins. Afterwards a swelling appeared, and even then the condition was obscure. He was seen by several leading surgeons, and the diagnosis of sarcoma was at length arrived at. Amputation below the trochanter

was performed by Dr John Duncan, nearly a year after the symptoms first began. The patient made an excellent recovery, and had returned to business, when the disease appeared in the brain, and, after a few weeks' illness, carried him off.

The section shows the tumour to be growing round the outside of the bone, which is, however, also partly affected in the interior. The substance of the tumour is vascular, soft, and friable, with a few bony spicules. Under the microscope it is a large spindle-celled sarcoma. G. C. 3463.

Presented by Alexis Thomson, F.R.C.S.E.

6. 410. Osteo-Sarcoma of the Lower End of Femur.—Anterior half of the lower end of a right femur—macerated, illustrating the above.

A somewhat lobulated tumour has grown from the inner side at and above the knee-joint, and apparently contains bony spicules. In the interior the tumour substance has invaded the cancellous tissue. G. C. 2478.

6. 411. Osteo-Sarcoma of Leg and Foot.—Section of the lower part of a right leg and foot—in spirit, illustrating the above.

"1828.—Mr B., aged 57, healthy and active, formerly of habits unmarked by any peculiarity, about eight years ago, while travelling by night on the outside of a stage-coach, had his legs and feet extremely benumbed with cold, and in a few days they were affected with severe pain. The left leg soon grew permanently well; the right leg never did. The pain was seated in the shin-bone, varying according to the season and state of the weather. About two years since, the anterior angle of the tibia had become serrated (*sic*); in a few months afterwards a swelling of the periosteum appeared on the middle of the bone. This was reduced by a blister and issue. In February 1827 the lower two-thirds of the bone were become enlarged. Numerous processes from the anterior and posterior angles distended the neighbouring muscles; much thickening of the soft parts round the lower end of the bone, and œdema of the foot. At the end of three months, during which the treatment consisted of repeated applications of leeches and blisters, mercurial alteratives, sarsaparilla, and regulated diet, there was a considerable diminution of the pain and of the swelling of the soft parts, but little or no reduction of the size of the

bone. Amputation was now advised, but Mr B. was induced to place himself in the hands of a quack, who applied stimulating plasters to the leg, with a view, he said, of bringing on suppuration, and salivated Mr B. with mercury. At the end of three months this person was dismissed, and the former medical attendant again requested to see the patient. A great change had taken place—emaciation, pale complexion, bad appetite, constipation of the bowels, a quick, weak, and irregular pulse; the leg greatly increased in bulk and deformity, hard all over, and exquisitely painful. Its surface was irregular in consequence of several large tubercles, round, firm, and elastic, and somewhat yielding to pressure. The colour of the leg is livid and dark purple, and the tubercles of a dusky yellow, some of them superficially excoriated. The tibia, up to its tubercle, is swelled. The knee and thigh are apparently sound, but the inguinal glands are enlarged and indurated, though not painful.

In a consultation with Professor Russell and Dr Thomson, amputation was again judged proper. This was performed, above the knee, on the 4th September last (1827).

The leg was injected with minute-size injection, and a vertical section made. The tibia nearly in its whole length appeared enlarged, and degenerated into a texture more like the carcinomatous than any other. The tibia at its middle seemed a little bent, as if it had yielded to the weight of the body. All the soft parts, with slight exceptions, had the same marked appearance as the tibia.

The stump healed in good time. The swelling of the inguinal glands entirely subsided, and the patient, with occasional slight attacks of indisposition, recovered his former health and vigour. A slight irregularity of the pulse remains, which, previous to the removal of the limb, was conjectured to depend on a thickened state of the cardiac valve, and was considered as no objection to the operation.

The tumour, which is blanched by the spirit, has surrounded the tibia, and in its growth outwards has apparently partly infiltrated the muscles, partly pushed them and the tendons before it. G. C. 1035.

6. 412. Osteo-Sarcoma of the Tibia. — Transverse section of the tibia and tumour from previous case—in spirit, illustrating the above.

This section of the tumour shows its relations and mode of growth even better than the last one does. G. C. 1035. a.

6. 413. Osteo-Sarcoma of the Tibia.—Macerated portion

of a transverse section of the tibia from the previous case, to illustrate the above.

An irregular outgrowth of bone surrounds the tibia, and has evidently been part of the tumour. G. C. 1035.

6. 414. Osteo-Sarcoma of the Tibia.—Plaster cast of the leg and foot from the previous case, before amputation.

The cast shows well the characters described in the history of the case 6. 411. G. C. 1036.

6. 415. Osteo-Sarcoma of Tibia.—Upper parts of a tibia and fibula of a young person (epiphysis not yet united)—macerated, illustrating the above.

There has been considerable loss of substance of the tibia at one place with development of new bone in the form of delicate spicules and plates at other places near. This has probably been a case of rapidly growing periosteal sarcoma, which has worked inwards as well as outwards. G. C. 376.

6. 416. Osteo-Sarcoma of Innominate Bone.—Portion of an innominate bone—macerated, illustrating the above.

A very large fungus tumour enveloped this bone.

The outer surface is covered with beautifully delicate spicules and plates, running outwards in various degrees of obliquity, the original bone below being greatly opened out.

A cast of the os innominatum, showing the tumour, and also a specimen of the tumour, were entered in the General Catalogue, but cannot now be traced (1893). G. C. 815.

6. 417. Osteo-Sarcoma of Humerus.—Section of the lower

end of a humerus and elbow-joint, with tumour and adjacent soft parts attached—injected with carmine and gelatine, and in spirit, illustrating the above.

The patient was a man, aged 68. The swelling appeared at the back of the arm one year before the operation, and was taken at first for an enlargement of the bursa over the olecranon. The rapid growth, however, soon made its nature apparent, and the arm was amputated.

The tumour was soft, with small calcareous and osseous deposits scattered throughout it, especially at the margins. It has invaded the bone, and seems to have pushed the muscles and fascia aside rather than infiltrated them. G. C. 2837.

Presented by Joseph Bell, F.R.C.S.E.

Periosteal-Sarcomata, *i.e.*, Tumours like the preceding, only growing too rapidly for much development of bone.

6. 418. Periosteal Sarcoma of Femur.—Posterior half of a left femur, with a periosteal sarcoma growing from its middle two-thirds—in spirit.

"John Wright, aged 13, was admitted into the Royal Infirmary under Dr Handyside on 13th June 1843, with an extensive tumour of the left thigh-bone.

"Six years since he had an attack of scarlatina, on recovering from which the left thigh remained weaker than the other, and appeared also to be smaller in size. For this the part had been rubbed frequently with various ointments. He continued to go about, otherwise quite well, till about six months ago, when, during the night, he was suddenly seized with violent pain in the thigh. Poultices were next applied to the affected part, and afterwards sinapisms and a few leeches; but under the treatment the thigh increased rapidly in size. Since then the tumour has gradually increased, and of late he has experienced considerable uneasiness from the frequent pain in it, and the deprivation of sleep thus occasioned.

"On examination, the thigh was found to be much enlarged, especially at its middle, whence it tapered gradually towards each extremity. The tumour was hard and inelastic, connected evidently with the os femoris, and it occupied about the three middle fifths of that bone, leaving its extremities of nearly the normal size. Its surface was smooth and regular, and over it the muscles and other soft parts could be moved freely. The integument over the disease presented a somewhat glistening appearance, but was not discoloured; and beneath it there appeared some faint blue lines, indicating distension of the superficial veins. The tumour was the seat of acute, darting pain, which became

increased towards night, and also underwent occasionally severe exacerbations.

"The lymphatic glands of the groin and of the rest of the body were carefully examined, and found not to be enlarged or otherwise affected. The motions of the hip-joint were perfect, and were performed without giving rise to pain. The limb below the knee was much emaciated. The countenance of the patient was sallow, and had an emaciated appearance, and his tongue was of a bright red colour. His body generally was not much emaciated, and his health appeared on the whole to be good." (*The London and Edinburgh Monthly Journal of Medical Science.* — Report of Case by John Struthers, Esq., House Surgeon, Royal Infirmary, vol. v., 1845.)

On 13th June the thigh was amputated at the hip-joint by Dr Handyside by the transfixion method, and the patient made a good recovery; and six weeks after the operation, *i.e.* 5th August, he left the Royal Infirmary, with the ligatures still discharging, but the stump otherwise doing well.

Soon afterwards he complained of occasional frontal headache, followed by pain in the left orbit and eyeball, with increased sensibility to light and lachrymation. About the middle of August a small chronic abscess formed over the occiput. These pains subsided for a time, but by the end of September had returned with such severity as to confine him to the house. By the end of October Dr Handyside drew up the following report:—"The left eyeball was very prominent and discoloured; almost complete loss of vision. The eyelids were so much tumefied as almost to conceal the eyeballs, and the veins of the eyelids were very conspicuous, being enlarged and tortuous. The orbit itself appeared to be also enlarged and prominent, especially towards its upper and outer part, forming there a hard, inelastic swelling. These parts were the seat of continual stinging pain, which prevented sleep, and was fast undermining his strength. Three chronic abscesses were situated over various parts of the head. There was a tumour of the size of an egg on the left hypochondrium, which was firmly adherent to and connected with the cartilages of the upper false ribs. It was slightly elastic to the feel, had grown rapidly, and was the seat of acute darting pains, being, like the tumour of the orbit, decidedly of a malignant character. The disease seemed to be fairly begun in the stump, particularly in that part of it which had been irritated by the long retention of the ligatures, as, at the part where the last ligature had lain, a small pale-coloured fungus protruded. The patient's body generally was emaciated, and his strength was worn down by the continued pain and the malignant hectic. To procure sleep he had been for some time in the habit of taking frequent and full doses of the solution of the muriate of morphia."

After this he rapidly sank, and died on 11th November, four and a half months after the operation. No *post-mortem* examination could be obtained.

The tumour is lobulated on the surface, but has infiltrated

the muscle, part of which is adherent to it. On the surface of the femur there are indications of erosion at some places, and of development of bone at others. The surface of section shows the femur to have been somewhat condensed in the interior, with tumour substance in the medullary cavity above the condensed part. Below it the cancelli form large spaces, and these at the time of section also contained sarcomatous material, part of which has since fallen out. The neck of the bone is partially absorbed, and the head is flattened from above. The whole bone was found "more soft and sectile than natural." G. C. 2273.

Presented by P. D. Handyside, F.R.C.S.E.

6. 419. Periosteal Sarcoma of Femur.—Cast in wax of the previous specimen before section.

The fusiform shape and the slightly lobulated character of the surface of the tumour are well brought out. G. C. 2274.

Presented by P. D. Handyside, F.R.C.S.E.

6. 420. Stump after Amputation for Periosteal Sarcoma of Femur.—Plaster of Paris cast of the stump from the previous case.

The cast was made on 10th September by Dr M'Lean. It shows a considerable swelling in the groin and in the anterior flap, for by that time the disease had recurred in the stump. G. C. 2275.

Presented by P. D. Handyside, F.R.C.S.E.

6. 421. Periosteal Sarcoma of Femur and Knee-Joint.—Quadrant section of the lower part of a thigh—in spirit, illustrating the above.

R. W., aged 18. Was admitted to Royal Infirmary, Edinburgh, on 4th September 1888. His mother and an aunt had died of consumption, but his family history was otherwise good.

The swelling dated from an injury in the beginning of June of the same year. At first there was swelling and pain at the inner side of the knee. These increased rapidly, and in three weeks quite prevented him

from walking. The swelling varied in size from time to time, and the pain which increased with the swelling was greater at night. It was sometimes sharp, sometimes aching. Blistering was tried without avail. There was difficulty at first in diagnosing between tubercular disease of the knee-joint and sarcoma of the lower end of the femur. The latter, however, was finally decided upon, and on the 10th of September amputation was performed at the hip-joint. Two days afterwards he died.

The disease seems to have begun in the periosteum, just above the epiphyseal line, and to have spread in all directions, *i.e.*, along the surface of the bone and into the medulla, into the soft textures of the joint, and outwards into the thigh. The disease has extended higher under the periosteum than it has in the medulla. The specimen was injected first with carmine and gelatine, and afterwards with tallow and vermilion, and the latter injection mass can be seen in numerous medium-sized arteries at the margin of the tumour, and also in many places within its substance. G. C. 2807.

Presented by JAMES HODSDON, F.R.C.S.E.

6. 422. Periosteal Sarcoma of Femur and Knee-Joint.—Small portion of the femur from the previous specimen—macerated, to illustrate the above.

The surface of the condyle, and of the shaft of the femur for four or five inches above it, is rarefied and partly absorbed. Above that there has been a slight but distinct development of the spicular bone characteristic of ossifying sarcomata. This, as it is traced upwards, forms a porous crust, which fades gradually away, but its margin is distinguishable from the surface above which is that of ordinary periosteal irritation. G. C. 2807. b.

Presented by JAMES HODSDON, F.R.C.S.E.

6. 423. Periosteal Sarcoma of Femur and Knee-Joint.—Glue and glycerine cast of the knee-joint in the foregoing case, before operation.

The cast shows well the globular swelling of the knee-joint, which rendered the diagnosis at first so difficult.

G. C. 2807. a.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 424. Fungating Periosteal Sarcoma of Tibia.—Section of the upper end of a left tibia, with patella, lower end of femur, and adjacent soft parts injected with vermilion, and in spirit, illustrating the above.

The following account is taken from Sir Charles Bell's "Surgical Observations of Cases in the Middlesex Hospital," etc., 1816, p. 390 :—

"French Ward (Middlesex Hospital). James Lewsley, aged 17.—I observed this young man in the waiting-room, as an Out-patient. He said his friends alarmed him by saying that he was going to have a white swelling in his knee. I found a disease, not in his knee, but in the head of the tibia, a tumour which to the eye appeared like a swelling over the bone; but which, on examining it more particularly, was obviously attended with an enlargement of the bone. Three months before this he had experienced a slight pain on the inside of the knee and head of the tibia, and it has continued till the present.

"From the moment I saw this patient I felt anxiety for him, and pointed out to the pupils that this was a tumour forming within the bone, and not a scrofulous enlargement; and desired that they should watch it, as in all probability it would prove another example of the fungus hæmatodes.

"For some weeks this patient was treated as for inflammation of a bone, by repeated application of leeches and blisters on alternate sides of the head of the bones; for presently it appeared that the heads of both the tibia and fibula were affected. By this means the general swelling was diminished, but on the outside, immediately below the patella, there remained a tense elastic swelling, resembling in some degree an enlarged bursa. Leeches were again applied and an issue made by caustic. But these means, added to opiates and sudorifics, had no effect in arresting the progress of the tumour, for the swelling had assumed a form which authorised that name. The opening by the principal caustic became an ulcer; that is to say, it showed a peculiar character, and began to widen. And observing that the leg had become œdematous, and that the tumour of the bones enlarged, and the ulcer had obviously a connection with the disease of the bone, I took the lad into the house on 22nd August.

"31*st*.—The tumour has increased in an extraordinary degree; it is larger than the first, and quite open and full-blown, like a flower. In its substance it is spongy and soft, and easily broken down; in colour it is cineritious, like slough, and bloody. It bleeds on being roughly treated, but has no sensibility. The young man's health begins to break. He has been informed of the change which would take place, and now it has come he stands prepared for the worst, and has consented to lose the limb. A cold lotion has been constantly on the limb, yet the tumour has increased with remarkable rapidity; it is of the size of both fists, and embraces the heads of the tibia and fibula. The leg is œdematous and the integuments inflamed.

"The limb was amputated about the 6th of September.

"20*th*.—He has had a restless night; his pulse is quick (100), and his tongue white; he was attacked with a rigour, which has been succeeded with heat. He is very sick and cannot retain anything on his stomach, and his countenance is sunk.

"*Observations at evening lecture.*—You have seen that I examined this patient very particularly to-day, and indeed his situation is very interesting; you may have seen that the stump looks well, the ligatures long since removed, and the wound contracted. There does not seem, therefore, any source of irritation in the stump. Whence then arises his present condition? He daily wastes away, and is very thin: he has shiverings followed with flushes; his tongue is white, and he is covered with perspiration, and there is a slight yellow tinge on his skin. Such an attack will sometimes precede the opening and disorder of a stump about the ninth day after the operation; or the patients in Hospital will be affected by the crowded state of the house. I wish I could so consider the present attack, but I fear it is from another cause—from the irritation of internal disease."

These symptoms increased, with the addition of pains in the right side, and heaviness in the stomach. The patient gradually sank and died on the 24th.

"*Post-mortem.*—The right side of the liver was much enlarged, and the surface was like variegated marble. There were spots of a bright yellow colour, from the size of a pin's head to that of the point of the finger. These spots were in clusters, and such parts of the liver felt soft, and around these spots there was a vascular structure, deeply stained with blood. Similar spots of disease were seen on the lungs, and some of these were of a vascular, soft texture, having the peculiar substance of the soft cancer intervening."

Although the tumour is stated to have begun within, it seems more probably to have begun in the periosteum. In contrast to the healthy texture of the lower end of the femur, the tibia has a condensed appearance, from its cancelli being filled with tumour substance. This has been observed in almost all the preceding periosteal tumours, and is quite different from the destructive changes produced by a central tumour growing at an equal rate with this one. The surface of the tibia has been attacked by the tumour. Without maceration, it cannot be said what amount of new bone, if any, has been formed; but even if there were little or none, this would still be in keeping with a periosteal tumour which had grown very rapidly.

*6. 425. **Osteo-Sarcoma.** — Section of an osteo-sarcomatous tumour, in which nodules of bone are interspersed among fibrous tissue; well developed. F. P. C. 2781.

6. 426. **Osteo-Sarcoma of Pubes.**—Soft portions of a tumour of the pubes.

The patient was treated for a long time for psoas abscess, under which complaint he was supposed to be labouring.

The substance of the tumour is firm, with a few bony spicules at some parts, and softening at others. G. C. 1059.

Presented by Professor JAMES RUSSELL.

6. 427. **Osteo-Sarcoma of the Sacrum.**—Plaster cast of the pelvis of a woman, aged 26—illustrating the above.

The patient was in labour for the first time. At the end of forty-eight hours she submitted to the operation of Cæsarean section, but died seventeen hours afterwards. The fœtus was still-born. (For case, see "Edinburgh Medical and Surgical Journal," No. 106.)

The tumour had grown forwards into the pelvis, and quite obstructed the passage. G. C. 1476.

Presented by WILLIAM CAMPBELL, F.R.C.S.E.

C. *Medullary or Central Tumours—ranging from the slowly-growing simple forms whose tissues are well developed (red marrow being normally cellular) to the rapidly-growing malignant forms whose tissues are more or less embryonic.*

6. 428. **Slow-growing Central Tumour of Lower End of a Femur.**—Section of the lower end of a femur, with adjacent soft parts—in spirit, illustrating the above.

The patient, M. G., a young woman aged 27, a dressmaker, was admitted to the Royal Infirmary, Edinburgh, on 8th November 1888, suffering from a large tumour affecting her knee.

---

* This and the next two specimens properly belong to the previous group of "Osteo-Sarcomata." The oversight was not recognised until after the type was set up, when it did not seem worth while to re-arrange them.

She, though never very strong, had always had fair health until eight years ago, when she fell and hurt her left knee. It was sprained, according to her doctor, and was "put in" by a bone-setter, after which she could walk. The knee remained swollen, but was not painful. She used a crutch till three years ago. In July 1888 "rheumatism" and swelling all round the knee-joint set in, and this has gradually increased until it has reached its present size. It is not painful.

The tumour, which is in the neighbourhood of the knee, measures twenty-four inches and a half in circumference, and fifteen inches in length. The patient can walk, but the knee is somewhat flexed.

The leg was amputated by a postero-internal flap, and the patient did well, except for occasional attacks of gastritis, to which she was previously subject.

She was discharged cured on 14th January 1889.

The tumour is composed partly of bone, partly of fibrous tissue, and partly of a soft substance, which has been breaking down. The bony part, consisting of both cancellous and compact tissue, forms walls and septa for the softer portions. The soft tumour substance has apparently grown through the lower end of the femur, and stretched the soft parts beyond it. Part of the cartilaginous surface of the condyle still remains apparently normal. The soft substance is composed of round and spindle cells, with numerous giant cells.

This slow-growing central tumour of the lower end of the femur may be compared with the similarly slow-growing periosteal tumour of the same part (No. 6. 393). G. C. 2838.

Presented by Professor T. Annandale.

6. 429. Myeloid-Sarcoma of the Head of the Tibia.—Fibula and section of upper end of tibia—in spirit, illustrating the above.

C. W., aged 36, was admitted to Ward 12, Royal Infirmary, Edinburgh, in April 1890, suffering from swelling over the head of the tibia. Fourteen months before he had received a blow on the leg by a falling stone, which kept him from work for a few days, and caused him pain, but no other discomfort. This was followed by a swelling, which was incised five months later, with negative results. Gradually the swelling increased in size. The patient had been losing flesh for four or five months. On admission there was a large swelling over the head of the tibia, painful on pressure, and yielding with a crackling sensation. On

4th April Mr Duncan amputated the leg at the knee-joint, and the patient made a good recovery.

In most parts the marginal bone has been reduced to a mere shell. Below and near the outer tuberosity the tumour substance is invading the healthy-looking bone, but with very little infiltration.

When fresh, the tumour had the characteristic appearance of a myeloid sarcoma. At one spot, *i.e.* below the crucial ligaments, there was some greyish sarcomatous-looking substance, but all the rest was like blood-clot, crimson, orange, and yellow in colour, as if in varying stages of decolorisation. These appearances are now much altered by the action of the spirit.

The blow had evidently broken the fibula, and seems to have splintered the tibia. G. C. 3174

Presented by JOHN DUNCAN, F.R.C.S.E.

6. 430. Myeloid-Sarcoma of the Head of the Tibia.—Water-colour drawing of the above tumour, showing its characters when fresh, by R. Murray, artist. G. C. 3174. a.

6. 431. Central Sarcoma of the Upper End of Fibula.—Section of a right tibia, partially surrounded by an enormous tumour of the fibula, with the adjacent soft parts—in spirit.

Mrs T., aged 62, was admitted to Chalmers Hospital in October 1890. She had been healthy until the present tumour began, about ten years before. The first symptom was pain over the head of the right fibula. This was followed by swelling in the neighbourhood, which increased gradually at first, but rapidly for the last twelve months. On admission the tumour surrounded the leg completely in its upper two-thirds. The maximum circumference of the tumour was twenty-two inches. The skin over it was tense, and the veins were dilated. To the touch it felt mostly firm and fibrous; it was fluctuating and apparently cystic in places, with a few calcareous masses perceptible in the walls of the cysts. Amputation was performed through the lower third of the thigh in October 1890, and the patient made a good recovery.

The tumour, when fresh, appeared to the naked eye to be a sarcoma infiltrating the muscles and tissues of the leg, with large areas of degeneration and blood extravasation. Microscopically, it was found to be a "fibro-sarcoma."

The greater part of the interior of the tumour was so soft and diffluent that it was washed out from what is now seen as an empty space. The upper end of the fibula is completely destroyed, but there are some plates of bone still remaining in the wall of the tumour. The tumour has, therefore, evidently burst through the fibula, after having partially expanded it. The muscles are stretched over the tumour, and partly involved in it.

G. C. 3233.

Presented by P. H. Watson, F.R.C.S.E.

6. 432. Central Sarcoma of Fibula.—Lower end of a right fibula—macerated, illustrating the above.

The bone about the middle has been transformed into a hollow shell, the wall of which is in some places very thin, while at others it is half an inch thick, and is composed of cancellated tissue. The lining of the interior shows irregular cavities.

This specimen was formerly described as a case of "spina ventosa."

W. C. G. 28.

6. 433. Central Sarcoma of Tibia.—Part of a right femur and bones of the leg and foot of a child—macerated, illustrating the above.

The lower half of the tibia has been destroyed by what must have been a central tumour. The affected part is represented merely by a membrane at the back and outer side, continuous above with the shaft. The interior of what remains of the cavity is smooth. The fibula in the region of the tumour has been flattened out into an elongated

plate, and is blended with the membranous wall of the cavity. Apparently, therefore, the tumour has been of comparatively slow growth. The bones of the foot are light and translucent.

B. C. 1. 6. M. 4.

6. 434. Central Sarcoma of the Ulna.—Remains of the lower end of a left ulna, with corresponding part of radius and the first row of carpal bones—muscles cleaned off and in spirit, illustrating the above.

The lower end of the radius has been almost completely destroyed, and an imperfect shell, composed partly of bone and partly of membrane, with "honeycomb" markings on its interior, is all that now represents it.

This must have been a central tumour, which has been removed in the process of preparation. Formerly called "spina ventosa." G. C. 1060.

Presented by Professor JAMES RUSSELL, **1827.**

6. 435. Central Sarcoma of the Lower End of the Humerus and Elbow-Joint.—The section shows the lower end of the humerus to present a V-shaped opening towards the elbow-joint.

A mass of decolorised tumour substance occupies the elbow-joint, and surrounds the head of the radius. It projects also from the skin backwards, but has been sliced off there. On the inside, the skin over the joint is scarred, probably the result of former treatment. G. C. 791.

Presented by Sir GEORGE BALLINGALL, **1825.**

6. 436. Central Sarcoma of the Lower End of the Humerus and Elbow-Joint.—Plaster cast of previous tumour before amputation. F. P. C. 2906.

6. 437. Central Sarcoma of the Lower End of the Femur.

—Section of the lower end of an injected left femur and adjacent part of tibia, soft parts partially dissected—in spirit, illustrating the above.

A large tumour growing from the lower end of the femur has almost entirely replaced it. The tumour is composed of lobules of soft substance, separated by firmer and more vascular tissue, and breaking down in the centre. The tumour has invaded the knee-joint, and has grown through the femur all round, especially behind. The bone is eroded but not expanded, and is not apparently infiltrated. A distinct capsule has been formed by the soft parts round the tumour. Described formerly as a "cancer of the lower end of the femur." G. C. 2446.

Presented by Bell Pettigrew, F.R.C.S.E.

6. 438. Central Sarcoma of the Humerus.—Right humerus, muscles dissected off—in spirit, illustrating the above.

A firm mass is seen continuous with the bone, and entirely replacing it between the upper third and the condyles. Various sections have been made, and a hole has been cut through the interior. The soft parts round the tumour have been pushed aside and an appearance of a capsule has been formed. G. C. 1054.

Presented by Professor James Russell.

6. 439. Sarcomatous Tumour of a Rib.—Portions of two ribs of the left side—in spirit, illustrating the above.

The interior of the lower of the two ribs is entirely replaced by a tumour. The substance of the tumour is somewhat spongy and spicular, and seems to have been breaking down. The upper of the two ribs is partly absorbed by the pressure of the tumour, which seems fairly well encapsuled on the outer and inner aspects.

"The section of a tumour formed on a rib, supposed by

some to be cancerous, by others to be scrofulous. I suspect the latter, as it wants those hard membranous septa so characteristic of schirrhus. When the fleshy parts are removed by putrefaction, the bone of this tumour puts on the same appearance as is seen in G. 38," *i.e.* 6.401. W. C. G. 43.

6. 440. Sarcoma of Rib.—Portions of the fifth, sixth, and seventh right ribs, with a small portion of lung and liver—in spirit, illustrating the above.

The patient, aged 44, was a strong and healthy man, though rather addicted to alcohol. There had been no injury, so far as was known, and no instance of malignant disease in the family history.

The tumour grew first on the sixth rib, and when first noticed was about the size of a small bean. He consulted Dr Craig, who became suspicious of malignancy, from the fact of the man's losing flesh rapidly, without any other apparent cause. In six months after Dr Craig was first called, the man died.

At the *post-mortem* examination, the tumour was found to be about the size of a small orange, and projected not quite so far into the pleural cavity as outwards. It was not adherent to the pleura. Secondary deposits occurred throughout the liver, and the lungs also showed traces of being affected. (See the "Edinburgh Medical Journal," February 1885, p. 735.)

The muscles lying over the primary tumour have been partly pushed aside, and there is an appearance of a capsule. This, it should be noted, is often misleading, and should not in practice be allowed to contra-indicate malignancy.

G. C. 2716.

Presented by W. Craig, F.R.C.S.E.

6. 441. Sarcoma of the Body of the Scapula.—Scapula and upper arm of a boy, aged ten—in spirit, illustrating the above.

The tumour had been several months growing. The case was first under the care of a medical man in the north, who recognised its

gravity. It, however, passed out of his hands into those of a female bone-setter, who did not improve matters by her attempt to set the so-called dislocation.

The patient then returned to his first attendant, who sent him to the Infirmary, to be under Dr Joseph Bell's care. It was at once evident that nothing short of amputation of the arm, scapula, and greater part of the clavicle, would be of the slightest use. The tumour involved both supra- and sub-scapular regions, and pressed on the axilla. It was also adherent to the skin of the back.

The operation was performed, and the boy made a good recovery from it, but died some months after from a return of the disease.

The tumour, which seems to have grown from the scapula near the neck, has spread in all directions, and has infiltrated the adjacent muscles.

G. C. 2725.

Presented by JOSEPH BELL, F.R.C.S.E., P.R.C.S.

6. 442. Central Sarcoma of the Head of the Tibia.—Section of the upper end of a left tibia—in spirit, illustrating the above.

Four months before admission to the Royal Infirmary, Edinburgh, the patient — a girl aged nineteen — had felt a pain below the left knee. A swelling appeared, which was blistered without benefit, then poulticed and incised, but only blood escaped. The pain returned nine weeks after the opening had healed. There was by this time a distinct hard lump, which gradually enlarged. On her admission to the Infirmary, on 10th September, the swelling lay midway between the tibia and fibula, about one and a half inches below the level of the head of the fibula, but apparently unconnected with either bone. The swelling was blistered and then incised, but blood only escaped, and the wound thus made rapidly fungated. Amputation above the condyles was performed by Mr. Cathcart on 19th September 1888.

The patient left the Hospital apparently in good health and spirits. A few months afterwards, however, she became exceedingly peevish and fretful, and, after emaciating rapidly, died with symptoms of a cerebral tumour. No post-mortem examination was obtained, but a secondary deposit of the tumour had probably attacked the brain.

The section shows a soft tumour invading and replacing the cancellous tissue of the head of the tibia and infiltrating the soft textures outside.

G. C. 2804.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 443. Central Sarcoma of the Tibia.—Portion of a tibia—in spirit, illustrating the above.

An infiltrating sarcoma has invaded and replaced the interior of the bone, and has formed a fungus mass on the surface outside. G. C. 185.

6. 444. Central Sarcoma of the Tibia.—Section of a left tibia periosteum removed—in spirit, illustrating the above.

A sarcoma has invaded and replaced the interior of the bone, near the upper end. G. C. 3104.

Presented by MACDONALD BROWN, F.R.C.S.E.

6. 445. Central Large Round-celled Sarcoma of the Upper End of the Femur.—Section of the upper end of a left femur, with portion of tumour and muscles attached—in spirit, illustrating the above.

The patient, aged 22, a butcher, tall (six feet), and thin, and seems to have rather overgrown himself. Still, he has been always healthy enough, though rather subject to colds. His family history is good.

In this end of February 1891 patient had "sciatica-like" pains in the left thigh, chiefly in the knee, and occasionally running up to the thigh. He rubbed in a strong embrocation, and poulticed the painful places at times. On the 6th July the pain became much worse, and Dr. M. was summoned. He gave him some medicine internally, and a liniment for the leg, which eased the pain during severe attacks. The pain was intermittent, worse at nights, and at times very severe. It prevented him from attending to his work. On 13th July he had improved and went back to work. The leg felt stiff, and he limped a little, but the pain was gone as long as the leg was kept quiet. But a slight jerk would cause intense pain, running down the front and inner side of the thigh. On the 13th and 14th July he continued at his work, which required him to be on his feet for nearly the whole day. On the 15th he went to work, but the pain came on in the thigh so severely that he had to go home. Dr. M. ordered rest, and he has remained in bed ever since, rarely sitting up for an hour or two at a time. The pain continued pretty severe.

On 16th July a little lump appeared on the side of the thigh, about 3 inches below the great trochanter. This soon disappeared with rubbing. But at this time the pain was severe up and down the thigh and leg, sometimes into the foot, but always most severe at the knee.

On the 29th July (at 11.30 A.M.) patient was lying on his back in bed, with his left leg drawn up. He was in the act of turning on his side, when he felt the thigh give a great crack in its upper third. The pain was intense, causing him to "roar out" at the time, and it remained severe for some time afterwards. On the morning before the crack, the patient had noticed a slight diffuse swelling of the thigh. After the crack the swelling quickly increased, till in three days it had reached its full size. At this time several injections of morphia were given, and the thigh was rubbed well with a liniment. The pain gradually decreased, and on 13th August he was free from pain, except when he gave the leg a jerk.

On the 18th and 19th August he had slight sciatica pains in his foot.

On 21st August an exploratory incision was made, and the previous diagnosis of sarcoma of bone was confirmed.

On 25th August Mr Cathcart amputated at the hip-joint. The patient bore chloroform badly, and had to be stimulated several times with ether.

Comparatively little blood was lost, and the patient did fairly well until 7.30 P.M., when he began to collapse, and died at 11 P.M.

The section shows that the tumour must have begun in the centre, just below the level of the great trochanter, where the bone is destroyed. It has extended down the medulla, and upwards into the cancellous tissue, but its chief growth has been outside the bone, entirely surrounding it, and infiltrating the adjacent muscles, although at places there is an appearance of a capsule. The upper fracture must have been the spontaneous one recorded in the history. The lower fracture was accidentally produced in sawing the specimen, but the bone was greatly weakened there by the disease. The substance of the tumour, when fresh, had a consistence and appearance like the white substance of the brain, except that at certain places it was more vascular. Microscopically, this is a large round-celled sarcoma; formerly it would have been called an "encephaloid cancer."

G. C. 3322.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 446. Central Large Round-celled Sarcoma of the Upper End of the Femur.—Water-colour drawing of the above tumour when fresh, by John T. Kelly, artist. G. C. 3321.

6. 447. Central Large Round-celled Sarcoma of the Upper End of the Femur.—Anterior half of the upper end of the above femur—macerated.

It shows the destruction of the bone at one spot, and its rarefaction at others. There is a slight amount of new periosteal bone formed beyond the rarefied area, probably "irritative," and due to the tumour's growth. G. C. 3323.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 448. Central Large Round-celled Sarcoma of the Upper End of the Femur.—Macerated fragments of the above tumour, which fell apart when a portion was macerated.

These show that bone was scattered in isolated pieces throughout the tumour substance beyond the femur.

G. C. 3324.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 449. Central Sarcoma of the Tibia.—Part of a tibia—macerated, illustrating the above.

The shaft is partially destroyed at one place, and shows a growth of new periosteal bone at others.

This is apparently the result of the growth of a tumour similar to the last. Formerly described as "necrosis."

G. C. 1161.

Presented by Professor JAMES RUSSELL.

6. 450. Central Sarcoma at the Lower End of the Femur.—Section of the lower end of a child's right femur and adjacent part of tibia—in spirit, illustrating the above.

"Janet S., aged 9, was admitted to the Royal Infirmary, Edinburgh, on 14th September, suffering from a great swelling of the right knee.

"The swelling is of a hard, elastic nature, with large superficial veins. The thigh of the same side is a little swelled, but not pained or inflamed.

"She reports that the swelling commenced in the month of May last, without any apparent cause. Leeches, blisters, yeast cataplasms with sweet oil, were applied before her admission, without any effect.

"On the 17th the limb was amputated about the middle of the thigh, the limb being removed, and the vessels secured by ligatures. The edges of the stump were brought together and secured in apposition by adhesive strap and bandage.

"The patient did well at first after the operation, but about 20th October the surface of the stump gradually opened, and a fungus of a greenish colour and foul character protruded. The inguinal glands being diseased, she was considered incurable, and dismissed accordingly.

"On dividing the tumour longitudinally, by sawing through the lower end of the femur, patella, and head of the tibia, the end of the femur appeared softened and somewhat enlarged, with a fungoid excrescence on its fore part. The surrounding muscles are altered in appearance. The cavity of the joint was but little affected, and the cartilages entire within."

The section shows a central tumour, which has destroyed the interior of the bone and passed extensively beyond and around it. The soft parts are infiltrated behind, but there is a semblance of a capsule in front. G. C. 773.

Presented by Sir GEORGE BALLINGALL.

6. 451. Central (?) Sarcoma of the Lower End of the Femur.—Section of the lower end of a right femur—in spirit.

The bone has been partially destroyed by the growth of a tumour, which seems to have started in the interior, and to have bulged posteriorly. Formerly this specimen was described as part of a femur "carious from the pressure of a sac of blood." G. C. 984.

6. 452. Central (?) Sarcoma of the Lower End of the Femur.—Other part of the same femur—macerated, to show alterations in the bone.

Above the condyle the interior is rarefied in some places and condensed in others. The surface of this affected part is somewhat rarefied, while above and below the rarefied area there is a crust of new periosteal bone. G. C. 984.

6.453. Sarcoma in the Stump of a Femur, after Amputation.—Portion of a femur—in spirit, illustrating the above.

The patient was a marine, in whom a very large tumour, 23 inches in circumference, had grown from the upper part of his left leg, between the 5th May, when his leg was jammed, and the end of September, when the note was taken.

The leg was amputated on the 5th October, and he died on the eleventh day after of tetanus, the stump, however, having been very unhealthy, with frequent secondary hæmorrhage, for several days before. The tumour had apparently been a sarcoma of the most malignant kind growing from the upper part of the fibula.

There is a large fungous projection of tumour substance from the lower end of the medulla, *i.e.* where the bone was divided at the amputation; while the medulla at the other end is seen to be full of the same material. (See case of Robert Lane, Bell's "Surgical Reports and Observations," p. 386.)

B. C. 1. 6. M. 30.

SARCOMA FOLLOWING FRACTURE.

6.454. Central Sarcoma of the Femur, following Fracture.—Section of the broken ends of the right femur of a man aged 45—in spirit, illustrating the above.

"This man is of middle stature, muscular, but not fat; his visage is particularly thin, and it has a foul yellowish colour; he has dark eyes and black hair.

"About nine months ago he broke his thigh-bone. The bone was knit together; he fell and broke it a second time at the same place. After the usual period of confinement, the bone being united, a tumour rose gradually in the very centre of the thigh. It was attended with great pain. It has uniformly and imperceptibly increased, until now that it forms a tumour measuring three times the circle of the natural thigh.

It occupies the middle of the thigh, and surrounds the femur, and projects nearly in an equal degree on all sides.

"There are here some peculiar circumstances, and a distressing alternative is offered to us. The tumour has all the appearance of fungus hæmatodes, or soft cancer. To the feeling it conveys the notion of a soft spongy mass, distending the fascia of the thigh. It is evidently under the muscles, and the vasti rectus and sartorius muscles bind it so as to give it a peculiarly irregular surface. The pain is very great, an incessant dull pain. While he describes his pain as a dull sensation, and in this expression distinguishes it from the occasional sharp and shooting pain of some tumours, yet his sufferings must be great in degree, since he expresses a desire to lose the limb. He is a steady man, and although not obtrusive nor loud in his complainings, he expressly wishes to lose his limb, although he sees that in order to do this it must be cut off close to his body. The skin has already assumed that light jaundiced colour, which on former occasions I have found to mark that the constitution is tainted with the disease.

"On the other hand, here is a tumour arising distinctly from an accident, and there is a possibility that the tumour so arising may not be that formidable disease which we apprehend. In the meantime the growth of the tumour is so rapid that an operation will soon be quite impossible. If it should prove to be tumour of the bone, possessing no malignant character, of which we see examples, amputation will save his life. Even if the disease be of the nature of soft cancer, the operation affords him a chance of life. No condition can be an aggravation of his present state.

"A consultation having determined on the operation, it was performed in the following manner."

(The leg was amputated, and on the tenth day after the patient died from secondary hæmorrhage.)

"When the muscles were dissected off, the tumour was found to surround that part of the bone which had been fractured. It consisted of a cartilaginous substance, which, when cut through the middle, exhibited a well or cavity containing blood. The rest of the tumour was a soft, pulpy, greyish mass, too delicate in its texture to be preserved in spirits. A section was made of the bone and the tumour; and when the parts were some days macerated, it was found that the bone was extensively diseased, and a peculiar semi-transparent matter of a grey colour filled all the cells of the bone; and now it appeared that the bone had been first diseased at the fractured part, and that from thence the disease had propagated itself in all directions.

"*Examination of the Stump and Body.*—On opening the face of the stump, both the femoral artery and the profunda were found secured by ligatures; a firm clot was found in the femoral artery, and the cause of hæmorrhage was nothing in common with what is called secondary hæmorrhage. On tracing one of the branches of the profunda, it was found to open, and, as it were, expand into a cavity containing blood. The substance surround-

ing this cavity was of a nature similar to the great mass of the tumour. There is little doubt that a small part of the tumour had been left, or that the muscles, tainted by the contact, had propagated the diseased action. The diseased portion, increasing with that rapidity which characterises this sort of tumour, had destroyed the coats of the vessel, and from this sprung the hæmorrhage which proved fatal. Had the tumour been entire, the blood would only have run into the interstices of its texture, but being open and upon the face of the stump, the blood had free egress. The cavity on the stump was in all respects similar to that found in the centre of the tumour.

"On dissecting out the head of the femur, and sawing it through and macerating it, the disease was seen to have propagated itself to the head of the bone and through the whole cancelli."

The broken ends of the bone are seen over-lapping, and apparently at one or two places united by bone. The greater part of the interval between the broken ends, however, has been occupied by the tumour substance; some of it has fallen away, but what remains is soft, grey, and somewhat translucent. This material can also be seen occupying the medullary cavity above and below the seat of fracture. (See case of Phineas in Bell's "Surgical Observations and Reports," p. 376.) B. C. 1. 1. M. 33.

6. 455. Sarcoma of the Femur, following Fracture.—Reproduction of plate ix. in the above-named volume by Sir Charles Bell, showing the appearance of the tumour before amputation. G. C. 3593.

6. 456. Sarcoma of the Femur, following Fracture.—Section of lower end of the femur from the previous case—in spirit.

The infiltration of the medulla by the tumour substance is well shown. B. C. 1. 6. M. 29.

6. 457. Sarcoma of the Femur, following Fracture.—Section of the stump of the femur, left after the amputation in the previous case—in spirit.

The infiltration of the tumour substance into the cancellated tissue of the neck is easily seen. B. C. 1. 6. M. 28.

6. 458. Sarcoma of the Femur, following Fracture.—Section of the lower end of a right femur—in spirit, illustrating the above.

In these two last preparations (see series 3. 247) we have instances of a circumstance, which I suspect not to be uncommon, fungus hæmatodes taking place in the bone after fracture of it." (Bell's M.S. Catalogue.)

The lower end of the upper fragment has projected into the front of the knee-joint, and has pushed down the patella before it. The interval between the broken ends of the bone is occupied partly by fibrous tissue and partly by the tumour substance, now shrivelled and blanched by the spirit so as also to look fibrous. B. C. 1. 1. M. 33. b.

6. 459. Sarcoma of the Humerus, following Fracture.—Section of the upper end of a left humerus—in spirit, illustrating the above.

From a patient in whom "fungus tumour" formed after fracture.

There is a sarcomatous tumour at the broken end, which has grown partly in the medulla and partly under the periosteum. G. C. 335.

Presented by WILLIAM NEWBIGGING, F.R.C.S.E.

6. 460. Sarcoma of the Humerus, following Fracture.—Other half of the previous specimen—macerated.

Near the seat of fracture there is a slight periosteal crust, but the original bone inside has been rarefied. G. C. 335.

Presented by WILLIAM NEWBIGGING, F.R.C.S.E.

6. 461. Sarcoma of the Humerus, following Fracture.—

Section of the lower end of the same humerus as the last—in spirit, illustrating the above.

The tumour growth can be recognised passing down the medulla towards the elbow. G. C. 336.

Presented by WILLIAM NEWBIGGING, F.R.C.S.E.

6. 462. Sarcoma of the Humerus, following Fracture.—Part of the soft portion of the previous tumour, with adjacent muscles—in spirit.

"Its tissue is medulliform, interspersed with bony spicules and nodules of cartilage." The muscles are being infiltrated all round; at one place in the interior, the tumour is breaking down. G. C. 335.

6. 463. Sarcoma invading the Tibia.—Upper part of the left leg of a young man—in spirit, illustrating the above.

"This young man was a sailor, and three months before the appearance of the tumour of the leg, he received a blow on the upper part of the shin by the recoil of a gun. He does not attribute the growth of the tumour to this hurt, and it was only by questioning him as to all probable causes that this circumstance was brought to his recollection. The tumour extends from the middle of the tibia to the tendinous insertion of the patella into that bone. It surrounds the tibia and the head of the fibula, and evidently goes round to the back of the bones, for it has distended the gastro-cnemius and the soleus muscles. Its surface is distinguished by seven or eight distinct knobs or tubercles, which are soft or yielding, and give no indication of solidity or of scirrhous hardness. The tubercles on the lower part of the tumour have more firmness and solidity than these above. The surface is of a dark reddish colour; the centre of the tubercles being of a yellowish colour, but crossed with numerous small veins, which give a venous or purplish tinge. The tumour has been two months of acquiring its present magnitude, and is not accompanied with pain.

"When this young man had been a few days in the Hospital, and when I had ascertained the disease to be that most mortal of tumours, the fungus tumour, called soft cancer, I informed him of his danger. He was surprised that I should consider it so seriously, but threw himself entirely into my hands. In these circumstances such confidence only adds to the

oppressive feelings which the anticipation gives rise to. At this time he had neither pain nor lameness.

"*Consultation.*—Notwithstanding the frequent application of leeches and blisters to the base of the tumour, and rolling the limb and keeping the roller wet, the disease has made progress. There is now pain in the tumour; a new lobe or convexity has formed, presenting the appearance of a suppuration pointing. Two spots on the old knobs have ulcerated and discharged a limpid fluid. The glands of the groin have enlarged very considerably, and they are tender. Do these circumstances warrant amputation, and what is the chance of saving the life? My colleagues look less despairingly on this case than I confess I do. It may be possible that the glands of the groin are inflamed only in consequence of the leech bites and blisters; but independent of this circumstance, I fear we shall see the disease take an unfavourable turn at the end of three months from its commencement. Amputation is determined upon as affording the only hope of saving his life.

"*4th day after amputation.*—The glands of the thigh and groin have subsided in a very remarkable manner. During the operation the muscles of the thigh were unusually pale. On the first dressing the surface was pale, although there was partial adhesion. On the second dressing the stump looked well, and the patient's health and spirits were observed to be very good. But about the ninth day the stump looked ill: there came a profuse gleety discharge, and the granulations were pale.

"*March 10th.*—The report is 'He looks ill, and has had rigours; here is the commencement of mischief.'

"*12th.*—For some days he has been looking ill, and falling low; he vomits everything he swallows. He has got some relief by the effervescing mixture with laudanum. His pulse is scarcely to be distinguished.

"*14th.*—'The stump is much changed: it is dry, for there is very little secretion; the soft parts have retracted, so as to expose the bone. His countenance has a dirty or dull gray colour. He is low and sick, and complains of a pain in his right side.'

"*15th.*—'He is sinking exactly as the former patient did. It is melancholy to see a young man, having no idea of a mortal disease, thus quickly cut off, and shocking to find this formidable disease so frequent, without affording any useful information to guide our future practice.'

"He died in the evening.

"*Dissection.*—We found the liver in a very extraordinary state. It was enlarged and almost black—that is, it had the colour of a large clot of venous blood; it was indeed very much gorged with blood. Within it were those soft tumours, indicating too evidently that either the external disease had been propagated and fallen on this viscus, or that there had originally prevailed a more general disorder.

"The amputated limb was injected, and it is preserved in the Museum. The veins injected from the saphena exhibited an extraordinary

and rich network running on the face of the tumour. The tumour is split, and forcibly torn asunder, so as to show the tibia within it. The periosteum has separated from the bone and remains attached to the tumour. The surface of the bone is left rough and indented by the pressure of the tumour. The structure of this tumour is the same with those we have seen, only that it retains a great deal more of the cartilaginous firmness."

B. C. 1. 6. M. 26.

CANCER (SECONDARY) OF BONE.

6. 464. Epithelioma invading the Tibia.—Section of a tibia and adjacent soft parts, injected with carmine and gelatine—in spirit, illustrating the above.

About thirty years before the amputation, the patient, a man aged 50, had sustained a compound fracture of the leg below the knee. Dr Gillespie, under whose care he then was at the Old Royal Infirmary, advised amputation, but the patient declined. After a long illness, he recovered, but ever since had suffered from chronic pains in his tibia, and his ankle remained fixed in the extended position. The scar which had resulted from the injury alternately healed and broke out from time to time until lately, when it began to spread persistently, and became exuberant. Epithelioma of the scar was diagnosed, and the leg was amputated. The glands in his groin were found enlarged, and were excised at the same time. When seen about a year after the operation, he was free from any return in the stump or groin, and was in excellent health.

The preparation illustrates the warty character of granulations which have become epitheliomatous, while the section shows how the epithelioma has been spreading downwards to the bone and eating into it. G. C. 3107.

Presented by A. G. Miller, F.R.C.S.E., 1889.

6. 465. Epithelioma and Chronic Suppuration eroding and destroying the Tibia.—Lower three-fourths of a left tibia and fibula—macerated, illustrating the above.

The leg was amputated for "spontaneous" fracture. As a boy, the patient, a man aged 45, had suffered from suppurative osteo-myelitis and periostitis ending in necrosis. The original wound had healed after some dead bone had been removed, but after an interval of several years had broken out again. More bone then came away, and the wound healed,

only to open again in a similar way after another interval. Three years before admission to the Royal Infirmary, the ulcer had again broken out. Numerous pieces of bone had come away, and the tibia suddenly snapped one day as he was trying to walk. The sore had a most fœtid odour, and was covered by masses of thickened epithelium, with here and there florid granulations which microscopically showed the characters of epithelioma.

The tibia, opposite where the ulcer was, is irregularly eroded and destroyed, a result probably due partly to the old-standing osteo-myelitis, as well as partly to the more recent epithelioma. The fibula is greatly thickened near the site of the ulcer, as usually occurs in such cases, but both bones are somewhat lightened in texture, possibly owing to the comparative disuse of the limb. G. C. 2794. b.

Presented by JOHN DUNCAN, F.R.C.S.E., 1888.

6. 466. Epithelioma and Chronic Suppuration, eroding and destroying the Tibia.—Cast in glue and glycerine of the limb in the previous case, after amputation, showing the appearance of the epitheliomatous ulcer. G. C. 2794.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 467. Epithelioma penetrating and eroding the Tibia.—Lower two-thirds of a left tibia and fibula, soft parts partly removed—in spirit, illustrating the above.

July 1825.—"The patient, a man, aged 35, reported that the disease commenced 20 years ago after the receipt of a contusion. Five years subsequently it healed, and remained so for ten years, when it again made its appearance. It has gradually increased since."

"On the anterior part of the middle third of the left leg there is a very extensive ulcer of the size of a hand's breadth, which has destroyed not only the integuments but part of the tibia, which is exposed and rough to the extent of an inch. The surface of the ulcer is very uneven; the granulations and discharge have a very unhealthy appearance. The secretion of pus is in large quantity. He complains of much pain, referable principally to the bone; surrounding inflammation considerable (*sic*). His general health is very good."

"1*st August.*—Mr Allan to-day scraped the surface of the bone, which he found to be very much diseased.

"5*th*.—Mr Allan to-day amputated the leg five inches below the knee, by the circular operation. Nothing uncommon occurred; and few vessels required to be tied. The patient bore it without expressing much pain.

"28*th*.—Dismissed in progress of cure."

This specimen shows that the tibia and fibula have been enlarged, as is usual, from their being in the neighbourhood of a chronic ulcer, but the destruction of the tibia is special, and is due to the inroads of epithelioma. G. C. 983.

6. 468. Epithelioma penetrating and eroding the Tibia.—Lower two-thirds of a left tibia and fibula—macerated, illustrating the above.

Both bones show the typical enlargement associated with chronic ulceration, with, in addition, an area of destruction on the tibia, doubtless due to epithelioma. This has evidently been a case of chronic ulcer, upon which epithelioma has supervened. W. C. G. 21.

6. 469. Epithelioma penetrating and eroding the Tibia.—Portion of a tibia—macerated, illustrating the above.

The substance of the bone is much eroded, at one place almost eaten through, while above and below the deficiency the bone has been thickened. This has apparently been another case of chronic ulcer, followed by epithelioma, which has invaded the bone. B. C. I. 5. M. 18.

6. 470. Epithelioma invading the Tibia.—Portion of a right leg—in spirit, illustrating the above.

"The leg was amputated above the knee, but the disease returned in the stump, and the man died."

This specimen shows that at some parts the ulcer has had normal granulations, while at others there are great irregularities

like cauliflower excrescences, due to the epithelioma. The periosteum has been dissected off the back of the tibia to show that the epithelioma had gone right through it. The fibula shows the usual enlargement. G. C. 307.

6. 471. Epithelioma invading the Tibia.—Portion of a right leg—in spirit, illustrating the above.

A large ulcer, almost entirely epitheliomatous, has extended down into the bone and greatly destroyed it.

G. C. 180.

Presented by Allan Burns, F.R.C.S.E.

6. 472. Epitheliomatous Ulcer of the Leg.—Plaster cast of a large ulcer of the leg, after amputation.

From its irregular surface, the ulcer has evidently been epitheliomatous, and must have attacked the bone.

F. P. C. 2877.

6. 473. Invasion of Os Calcis by Epithelioma.—Os calcis—macerated, illustrating the above.

"Malignant disease of os calcis in a tailor, æt. 30 years. Syme's amputation at ankle-joint—only side flap—disease returned six months after amputation at lower ⅓—patient recovered, no return of Disease 18 months after."

The bone has the appearance of having been gouged or scooped out in the neighbourhood of the greater tuberosity. Probably this has been due to an epithelioma. G. C. 3422.

6. 474. Scirrhus Cancer of the Sternum.—Sternum of a woman—in spirit, illustrating the above.

"The section of the sternum of a woman brought into my Dissecting Room in autumn 1807. It appeared, from a cicatrix on her breast not yet healed thoroughly, that her breast had been extirpated

as cancerous, but without success, as the disease had returned on the spot. The absorbent glands, both of the axilla and neck, were also diseased.

"The substance of the sternum is much thickened, and rendered softer than its natural state. A whitish substance, nearly cartilaginous, has formed on it before and behind. This substance in some places not only enters but extends through the sternum. It forms processes pushing outwards between the cartilages of the ribs, and is intersected with hard membranous septa." W. C. G. 44.

6. 475. Scirrhus Cancer of the Sternum.—Larger portion of the previous preparation—in spirit, showing the extensive involvement of bone on both aspects. W. C. G. 45.

6. 476. Scirrhus Cancer of the Sternum.—Section of the sternum of a woman—in spirit, illustrating the above.

The patient died of cancer of the breast. The lungs were also affected.

The disease is present on both aspects of the bone, but is as yet limited to the periosteum. B. C. I. 6. M. 14.

TUMOURS OF THE JAWS.

A. Lower Jaw.

1. *Cartilaginous.*

6. 477. Chondro-Sarcoma of Lower Jaw.—Section of what was a large fungus tumour—in spirit, illustrating the above.

It was removed from under the jaw.

The tumour is lobulated externally, and is seen to be composed of numerous nodules of cartilage, with connective tissue intersepta. The nodules are softening and breaking down in many places. B. C. I. 6. M. 34.

2. *Fibrous and Osseous, from the Periosteum and Bone—ranging from the slowly-growing simple forms whose tissues are well developed to the rapidly-growing malignant forms whose tissues are more or less embryonic.*

6. 478. Exostosis of the Lower Jaw.—Portions of an osseous tumour, covered with warty growth, removed from the gum of a lower jaw—in spirit.

The bone is well formed, and the tumour has evidently been of slow growth.

F. P. C. 3005.

6. 479. Enormous Fibro-osseous Tumour of the Lower Jaw.—Plaster cast of a head and neck, showing an enormous tumour of the lower jaw, successfully removed by Professor Syme. The lines of the incisions used at the operation were marked in when the cast was presented.

The following note is by Professor Syme:—"Between eight and nine years ago, Robert Penman, from Coldstream, then sixteen years old, noticed a hard swelling of the gum on the outer side of the grinding teeth of the lower jaw. The swelling was not painful, but gradually increased. When it attained the size of an egg he applied to a surgeon of the neighbourhood, who extracted three of the adjoining teeth. It then grew more rapidly, and having at length become as large as an orange, induced him to repair to the Royal Infirmary of this city, where it was removed, *i.e.*, cut off from the bone. The wound did not heal, and the actual cautery was repeatedly applied in vain to make it do so. After remaining eight months in the Infirmary, he returned home; but finding the tumour rapidly and regularly increasing, he two years afterwards came again to Edinburgh, and consulted a distinguished operating surgeon (now in London), who declined to make any attempt towards his relief. He went home with the fearful prospect of a certain lingering and painful dissolution; and it was after *three years and a half* spent in this miserable state that Dr Sibbald of this city happened to see him. Though the tumour was then nearly three times larger than it was when the patient last quitted Edinburgh, Dr Sibbald felt persuaded that it was still within the reach of surgery, and therefore encouraged the young man to come once more to town, which he accordingly did.

"Though prepared for something very extraordinary, I certainly was astonished at first sight of the patient.

"The mouth was placed diagonally across the face, and had suffered such a monstrous distension as to measure 15 inches in circumference. The throat of the patient was almost obliterated in appearance, there being only about two inches of it visible above the sternum, so that the cricoid cartilage of the larynx was on a level with that bone. When the tumour was viewed in profile, it extended eight inches from the front of the neck. It completely filled the mouth, and occupied all the space below it from jaw to jaw. The tongue was thrust out of its place, and lay between the teeth and cheek of the right side. The only portion of the jaw not implicated in the disease was the right ramus and base of the same side, from the bicuspid teeth backwards. The tumour, where covered by the integuments, was uniformly very firm, and for the most part distinctly osseous. The part which appeared through the mouth was a florid, irregular, fungous-looking mass of firm consistence, from which an alarming hæmorrhage had occasionally, and for the last three or four weeks there had been almost daily a discharge of blood to the extent of one or two ounces. Notwithstanding the great bulk of the tumour, the patient could move his jaw pretty freely in all directions. With the exception of the disease now described, Penman enjoyed good health. He was a tall, well-made, though much emaciated, intelligent young man, and possessed uncommon fortitude." The tumour, along with more than half the lower jaw, was removed by Mr Syme on 7th July 1828, and the patient made a good recovery.

In 1848 Mr Syme added to the above:—"About two years ago, and consequently seventeen years after this operation, I was stopped in the street by a well-dressed, respectable-looking man, who introduced himself as Penman. He told me that after working for several years at home as a bootmaker, he had gone in quest of better wages to New York: that he had spent ten years in America, whence he had just arrived; and that he proposed to return there after a short visit to his native country. I was no less surprised than pleased to see how little the operation had injured either his appearance or articulation. Careful inspection, indeed, was required to enable an ordinary observer to detect anything peculiar in either of these respects."

(Syme's "Contributions to the Pathology and Practice of Surgery," p. 13. 1848.)

G. C. 1185.

Presented by DAVID R. DOBIE, M.D.

6. 480. Ossifying Sarcoma of the Lower Jaw.—Right half of the body of a lower jaw—in spirit, illustrating the above.

The greater part of the lower border of the bone is replaced by a sarcomatous tumour, which extends laterally on both aspects.

From the unworn appearance of the erupted teeth, and the presence of the wisdom tooth in the jaw, this has evidently been from a young person. G. C. 3419.

6. 481. Ossifying Sarcoma of the Lower Jaw.—Greater part of the right and portion of left side of a lower jaw—in spirit, illustrating the above.

An ossifying sarcoma replaces the greater part of the bone, invading the floor of the mouth, and passing outwards as well. The teeth have been loosened, and comparatively little of the original jaw structure remains. G. C. 1040.

Presented by JOSEPH BELL, F.R.C.S.E.

6. 482. Ossifying Sarcoma of the Lower Jaw.—Plaster cast of chin and neck, apparently from the patient from whom the last specimen was taken.

Reference was made in the M.S. Catalogue to a cast of the last preparation. That cast is now missing, but as this cast had lost its number, and as it corresponds to the previous specimen, it is most probably the one in question. G. C. 1040. a.

6. 483. Tumour of the Lower Jaw.—Plaster cast of a tumour of the lower jaw.

It had apparently started from the left side of the lower jaw, and grown downwards into the neck. Its outer surface is somewhat lobulated. F. P. C. 2866.

3. *Central Tumours — ranging from the more slowly-growing simpler forms whose tissues are better developed to the rapidly-growing malignant forms whose tissues are more or less embryonic.*

6. 484. Myeloid Sarcoma of the Lower Jaw.—One half of a

myeloid sarcomatous tumour, which grew from the symphysis of the lower jaw of a boy—in spirit.

William D., aged 10, was admitted into the Royal Infirmary, Edinburgh, on 23rd July 1890.

About three months ago patient noticed a small lump growing on his gum. The patient had some bad teeth extracted, which were supposed to have caused the swelling. He thinks it was less for a time, but shortly afterwards began to enlarge rapidly. Since that time it has remained much the same as it is now.

Growing from the inferior maxilla, in the position of the two middle and left lateral incisor teeth, there was a rounded swelling projecting into the mouth, and dusky red in colour, except at the top, where it was pigmented. It was soft to the touch and bled easily. After the patient had been in Hospital for some time the swelling became firmer. He felt no pain from it, but could not masticate his food properly, and his mouth had a nasty taste and a fœtid odour.

The general health and family history are good.

On 12th August 1890 the patient was put under chloroform, and Mr Cathcart freely excised the tumour, with the adjacent bone, and removed one or two large glands below the angle of the jaw.

In August 1892 the boy was brought to the Infirmary to report himself. There was no return of the tumour, and he was in good health. There were some slight enlargements of the lymphatic glands below the lower jaw, but they were in all probability not connected with the tumour.

The section of the tumour shows that it has grown out from the centre, and has caused absorption of the greater part of the bone, except along the lower border. G. C. 3207.

6. 485. Myeloid Sarcoma of the Lower Jaw.—Left and part of right half of the body of the lower jaw of a young woman—in spirit, illustrating the above.

Janet E., aged about 25, had noticed, three or four months before admission to the Royal Infirmary, Edinburgh, a swelling on her lower jaw. It caused no pain, but she had one or two teeth removed, as they were supposed to be the cause of the growth. The growth increased, and she came for advice to Dr Joseph Bell, who removed the tumour and lower jaw. The patient made a complete recovery, and now, six years afterwards, she remains in perfect health.—(C. W. C., 1893).

The bone towards the angle has been almost entirely replaced by the tumour, which has, moreover, projected extensively beyond it, towards both the mouth and the cheek.

Although the limits of the tumour are fairly well defined, there is no distinct capsule. From this fact, as well as from the comparatively rapid growth of the tumour, a return might have been expected, and its absence confirms the view held of the relatively simple character of these tumours. This tumour has the usual microscopical characters of a myeloid-celled sarcoma. G. C. 2728.

Presented by JOSEPH BELL, F.R.C.S.E.

6. 486. Myeloid Tumour of the Lower Jaw.—Portion of the right half of a lower jaw, near the angle—in spirit, illustrating the above.

A large central tumour has grown outwards, partly expanding and partly replacing the bone. G. C. 3141.

Presented by MACDONALD BROWN, F.R.C.S.E.

6. 487. Tumour of the Lower Jaw of a Sheep.—Left half of the lower jaw of a sheep—macerated, illustrating the above.

There is a hollow, rounded tumour at the symphisis. Presented as a specimen of "spina ventosa." G. C. 1850.

Presented by JOHN CAMPBELL, F.R.C.S.E., 1837.

6. 488. Epithelioma involving the Lower Jaw.—Portion of the left half of a lower jaw, with adjacent soft parts—in spirit, illustrating the above.

A broken-down (probably secondary) epitheliomatous tumour has been attacking the outer surface of the jaw. Previously described as a "carcinomatous tumour." G. C. 1186.

Presented by ADAM HUNTER, F.R.C.S.E., 1828.

6. 489. Epithelioma involving the Lower Jaw.—Section of piece of a lower jaw—in spirit, illustrating the above.

It was removed for recurrent epithelioma.

The alveolar border has been attacked, and has been absorbed by the advancing tumour, some of which is seen in the interior. G. C. 2889.

Presented by Professor T. ANNANDALE.

B. Upper Jaw and Facial Bones.

6. 490. Fibroma of the Upper Jaw.—Wax cast of an enormous tumour of the upper jaw of a woman, successfully removed by Mr Robert Liston.

"Mrs Fraser, aged 40, from Banchory-Ternan, Aberdeenshire, was admitted into the Royal Infirmary of Edinburgh on the 13th of October 1834, under the care of Mr Liston.

"About six years ago she received a blow over the antrum, from the head of a child, immediately after which she perceived a slight hardness in the part which had been struck. This did not increase for some time after, but at the end of two years a distinct tumour was felt on the cheek. It grew very rapidly during the two following years. At this time she became pregnant, when, she says, it increased very much, especially after the quickening of the child. She had never suffered very much pain in it. About a year ago she had another child, since which time the catamenia have never appeared. The tumour seemed to her to grow more vascular after she had passed the menstrual period, and since then bleeding to a slight extent has occurred from the unbroken surface of the gums and inner surface of the tumour at these times when she should have been unwell.

"On her admission the tumour presented the following appearance:—The left side of the face is completely occupied by an immense growth, which obstructs the eye of that side, rising to a level with the forehead, extending back to the ear, and bulging down below the inferior maxilla, but not attached to it. From the part of the tumour next to the ear to that part in front of the face, it measures about nine inches. The mouth is completely drawn to the left side, and there is a constant discharge of saliva from it. She keeps a handkerchief constantly applied to it by the hand, to concentrate the sound of her voice when speaking, and to collect the saliva. She is unable to open her mouth above three-fourths of an inch. The tumour bulges considerably into the cavity of the mouth, but there is no difficulty of swallowing. The nose is also twisted to the left side, but she can breathe through it pretty easily. From these distortions the face has a truly frightful appearance. Numerous large veins are seen beneath the integuments of the tumour, and arteries of considerable size are felt beating in it. Her general health is good, and she has firmly made up her mind to undergo the operation for removal of the tumour, on account of its inconvenience and unsightliness." (From "Observations on some Tumours of the Mouth and Jaw," by Robert Liston, Esq., in the 20th vol., 1837, of the *Medico-Chirurgical Transactions*, London.)

About two years afterwards the following note was given by the patient's local medical attendant, and is appended to Mr Liston's observations previously quoted from. "Having seen the mother of the lady with the gold palate yesterday, I am enabled to assure you that she continues perfectly well. She finds Nasmyth's apparatus answer admir-

ably, and has completely recovered her voice, which you may remember was somewhat indistinct for some time after the operation. In a word, she is one of the most happy women I am acquainted with."

The following is the description of the original tumour, No. 2441, in the Catalogue of the Museum of the Royal College of Surgeons, England, page 47 :—"The tumour is of irregular form, superficially lobed, and smoothly rounded in every part. Its diameters are—vertically seven inches, transversely seven inches, and from before backwards nearly six inches; the portion of integument removed with it measures about twelve inches in length and ten in breadth. Towards the mouth the tumour presents a circular concave surface, projecting on every side beyond the palate. A portion cut from the left side of the tumour shows that it is composed of a pale, whitish, firm, compact, and homogeneous substance." G. C. 1706.

Purchased 5th December 1834.

6. 491. Fibroma of the Upper Jaw.—Plaster cast of the head of the patient from whom the previous tumour was taken, showing its size and relations before operation. G. C. 1706. a.

6. 492. Fibro-Sarcoma of the Upper Jaw.—Plaster cast of the head of a young person, illustrating the above.

A very large tumour has grown apparently from the left superior maxilla. It has pushed aside the left eye, and grown outwards in a manner somewhat similar to the last. It appears, however, to have been more malignant, from having a less clear definition, and from seeming at one place to have begun to fungate. G. C. 3421.

6. 493. Osteo-Sarcoma of the Upper Jaw.—Portion of a tumour—in spirit, illustrating the above.

It was removed from the region of the antrum of the left upper jaw-

bone, and seemed to arise from the substance of the bone. "The wound healed."

The substance of the bone is firm and somewhat fibrous, with an intermingling of spicules of bone. G. C. 1272.

Presented by JOSEPH BELL, F.R.C.S.E.

6. 494. Sarcoma of the Antrum of Highmore.—Portion of a large sarcoma, laid open—in spirit, illustrating the above.

The following is an excerpt from a "clinical lecture on the case of Hugh Morrison, aged 51, delivered by Sir George Ballingall to the students of Surgery in the Royal Infirmary, Edinburgh, at the conclusion of the summer course for 1827."

"Four months ago (before admission to Infirmary), after exposure to cold, he was affected with pain in the molars. One of them was extracted with a little relief, the alveolus was punctured, and about a gill of clotted blood evacuated. Complaint is attended with gnawing, lancinating pain, which becomes worse in the night, and he is much subject to headache. General health good.

"There is an extensive tumour in the region of the superior right maxillary and malar bones, bounded above by the tarsal edge of the lower eyelid, by the extremity of the nasal process of the superior maxillary bone, and by the external angle of the frontal bone. Inferiorly, it extends to below the level of the teeth of the upper jaw; posteriorly, it is bounded by the zygomatic process and by the anterior edge of the ramus of the lower jaw: internally it has driven the inner wall of the antrum into the nostril, so that a probe is not easily passed through the inferior meatus; the palatine process of the superior maxilla is softened, and also very much inclined inwards. Two of the bicuspid teeth are quite loose; the remainder of the teeth placed behind the above have been removed. Two or three glands upon the parotid are enlarged. The surface of the swelling is irregular—in some places soft, in others hard and cartilaginous. Vision, hearing, and smell on the affected side are all impaired; the eye, however, is not protruded from the socket; deglutition is attended with some difficulty."

The tumour was removed with considerable loss of blood; but the patient recovered from the operation.

The disease, however, returned, and on March 28th Mr Macpherson, his medical attendant at home, described "the appearance of the tumour to be truly appalling; nearly the whole surface being in a state of active ulceration and occasional discharges of blood from the ulcerated vessels. The patient's appetite had completely failed. He was harassed with diarrhœa, and could not be expected to survive many days."

The surface of the tumour is smooth at one part and warty

and irregular at another. The interior, where divided with the knife, is composed of a finely cystic substance, subdivided at some places into lobules of varying size by a delicate stroma of connective tissue. G. C. 934.

Presented by Sir GEORGE BALLINGALL.

6. 495. Sarcoma of the Antrum of Highmore.—Plaster cast of the right half of the face of a man—illustrating the above.

There is a tumour springing from the upper part of the superior maxilla, which answers to the description given of the patient from whom the preceding specimen was removed.

F. P. C. 2835.

6. 496. Malignant Tumour of the Upper Jaw.—Plaster cast of right side of the face of a man—illustrating the above.

A large tumour of the upper jaw has involved the face from the nose nearly to the ear, and from the eye to the mouth.

G. C. 3587.

6. 497. Malignant Tumour of the Upper Jaw.—Face and anterior part of the head of a man—injected and in spirit, illustrating the above.

"When he first presented himself at Middlesex Hospital, he had a large fungus tumour, which projected from the left side of his face, occupying the left side of the mouth, and hiding the left eye. After some time it burst, ulcerated, and bled frequently, exhibiting all the appearances of fungus hæmatodes."

The whole of the left side of the face is occupied by a fungating mass, which is broken down at one place. The hard palate has been involved, and large masses project down into the mouth as well as up into the nose. The left posterior naris is completely blocked. B. C. 1. 6. M. 38.

6. 498. Malignant Tumour of the Upper Jaw.—Bones of the face and anterior part of a skull—in spirit, illustrating the above.

A malignant tumour, starting apparently from the left upper jaw, has invaded the orbit, extended across the nose to the opposite side, and passed backwards into the anterior and middle fossæ of the skull. G. C. 3390.

6. 499. Malignant Disease of the Upper Jaw.—Wax model of a case of the above.

The disease has infiltrated extensively into the cheek, and involved the nose and mouth, displacing the teeth.

G. C. 1570.

Purchased **1834.**

6. 500. Malignant Tumour of the Upper Jaw.—Superior maxillæ and adjacent bones of the face from an old man—in spirit, illustrating the above.

Both superior maxillæ and the adjacent parts have been invaded by the tumour, and the nasal cavities have been almost completely blocked. G. C. 786.

Presented by ALEXANDER WATSON, Esq., and Dr CULLEN.

6. 501. Malignant Disease of the Antrum.—Eyeball and part of the right half of the bones of a face and skull—in spirit, showing extensive invasion.

"Mr M., an elderly gentleman, of a broad brawny figure, and having a healthy constitution, came to town to-day (Aug. 1813), afflicted with this loathsome disease. It began early in June by slight pains affecting one of the upper frontal teeth of the left side—the side opposite to that in which the disease was situated. The pains resemble toothache, and excited some swelling of the gum, which, however, soon abated. Shortly after this, acute stinging pains attacked the gums of the upper jaw of the

right side, shooting to the crown of the head. These soon became so severe that he was unable to tell whether they originated in the gums or in the head. They were augmented in the night, but fortunately some times were relieved by perspiration, to which he was somewhat subject. The right side of the face, from the eye downwards to the mouth, now began to swell, attended by a degree of numbness, affecting chiefly the wing of the nose and the upper lip. The patient, conceiving the numbness to depend on languid circulation, used friction, which, having no effect, he tried bathing the neighbouring parts with rum. This, however, aggravated the pain. He then put himself upon low diet, bathed his feet now and then at bed-time, and took occasionally laxatives, but all to no purpose. His eyes now became tender and sore, but showed little tendency to inflame. The eye of the affected side soon became weaker and the vision to be so much impaired that he dreaded he would lose the sight of it. It shortly afterwards became swollen and protruded.

"On the day of his arrival in town he had a robust constitution, had a firm step, a hale voice, and a round full face. But the right eye was swollen and protruded, the eyelid tumid and œdematous, with tunica conjunctiva bulging out from beneath them, thus completely shutting up the eye. He complained of the same toothache-like pains affecting the jaw and darting to the crown of the head; the benumbed sense of feeling in the ala nasi and mouth. These parts hung loosely, and quivered when he spoke, indicating paralysis. On opening the eyelids, the eye itself was sound and of its natural form and size, but evidently raised from its socket. There was no swelling in the cheek, no obstruction in the nostril, no disease of the teeth, no tumour in the throat. But by introducing the finger within the mouth, there could be felt a small tumour immediately above the first grinding tooth of the affected side; and on the outside this felt soft. By pressing this tumour a yellow serum flowed out at the nostril. The gum covering the bulbous process of the superior maxillary bone, and where the three backmost grinders had been, felt soft and spongy, resembling softened bend-leather. These teeth had gradually decayed. They had not been forced out by the disease. He was able to eat pretty heartily, and take a walk around the town."

The tumour increased rapidly, and the patient's system sunk accordingly.

On 6th September, Mr Bell, under whose care he was, attempted partial operation, but the tumour was not removed, and the patient got rapidly worse, and died on the 28th.

"*Dissection.*—The ball of the eye had suppurated and burst. The cheek was one great abscess. The cheek bone and walls of the antrum were completely carious. The tumour was now seen arising from the fatty substance at the bottom of the eye, and the upper and part of the antrum, and from these running obliquely outwards to the cheek, where it was bound down to the alveolar processes by adhesions. In some places the tumour was lobular, and resembled in form and colour a salivary gland, while in others it was granular and gristly. Around the membranous

surface of the antrum there were many little granular tubercles. These likewise studded the palate and throat, the membranes of which were soft and swollen. The septa of the nostrils were thickened."

The tumour has invaded and replaced the bones forming the floor and inner wall of the orbit, as well as those forming the wall of the antrum. G. C. 969.

6. 502. Malignant Disease of the Superior Maxilla.—Upper maxilla of an old woman—in spirit, illustrating the above.

The superior maxilla was excised by Dr Peter Maclaren, and the patient recovered from the operation.

The tumour substance was soft and friable when fresh. It has grown outwards on to the cheek, but has not involved the palate. G. C. 2841.

6. 503. Malignant Disease of the Upper Jaw.—Section of the head and face of a man—in spirit, illustrating the above.

The tumour, starting from the upper jaw, has fungated between the eye and nose, and, extending upwards, has reached the cranial cavity through the frontal sinuses. G. C. 3297.

6. 504. Malignant Disease of the Nasal Cavity and Frontal Bone.—Section of a frontal bone—in spirit, illustrating the above.

"From a patient who had excrescences frequently removed from the nose."

The frontal sinuses and cribriform plate have been invaded by the malignant growth. The surface of the tumour is lobulated, and the interior is formed of small nodules separated from one another by a delicate stroma, and mostly softening in the centre. G. C. 634.

6. 505. Malignant Disease of Facial and Cranial Bones.—

Part of the face and skull of an adult, probably a woman—in spirit, illustrating the above.

A malignant tumour has invaded the superior maxillæ and adjacent parts, extending into both orbits and the nasal cavity, and involving the left anterior and middle fossæ of the skull.

G. C. 1908.

Presented by The Medical Officers of Leith Dispensary.

6. 506. Malignant Disease of Facial and Cranial Bones.—Portion of the bones of the face and skull of a woman—in spirit, illustrating the above.

"About four years ago the woman, Susanna Todd, aged 39, had a small tumour of the size of half a hazel-nut on the gum over the first molaris of the upper jaw. It continued to increase for two years. At this time a medical gentleman thrust his lance into it, but nothing but blood flowed from it. The wound did not heal, and from that time the tumour rapidly increased for the space of a year, bleeding from time to time. She observes that these bleedings always relieved her, so that she was at this time suffering pain. The tumour had now enlarged the alveolar process, and appeared as a tumour on the cheek. She went into Hospital, and they drew two of the molares, and cut away a portion of the gum; but she derived no further advantage from this than that for a time she was freed from the portion of the tumour which projected into the mouth and plagued her in eating. She was eight months in the Hospital. While she was attending there, they thrust a probe into her nostrils, to which she attributes the blindness of the left eye; but this is evidently a fancy of hers.

"From the Hospital she was carried to the workhouse, and nothing further took place but the gradual increase of the tumour, which about three weeks ago produced a dimness of vision in the left eye, and in three days the sight was totally lost.

"She has now a large tumour of the whole left cheek, which appears like an irregular swelling of all the bones of the face. The alveolar processes are much enlarged, and project so that the upper jaw shoots far out before the range of the lower jaw. The tumour extends from the base of the lower jaw to the inner canthus of the right eye: it presses in upon the orbit, and has, in some degree, displaced the left eye. It has thrust the nose aside also; a fungous irregular tumour occupies the whole of the left side of the mouth and affects all the palate: it has shot back into the fauces, and presses upon the mouth of the Eustachian tube of the left side.

"*March* 15.—The tumour has considerably increased, for although it be flatter at the lower part of the cheek towards the eye, it is enlarged,

smoother, and more discoloured; the fungus in the mouth is more luxuriant."

The patient shortly afterwards died.

The specimen shows that the bones forming the anterior and middle fossæ of the skull on the left side and most of those on the right have been replaced by the tumour, which seems to have crept along their substance. The bones of the face on the left side, and greater part of those on the right, have been similarly involved. The left eyeball has been pushed out by the tumour from behind. B. C. 1. 6. M. 36.

6. 507. Malignant Disease of Facial and Cranial Bones.—Portion of the bones of the cranium, from the previous case—in spirit.

The disease can be seen replacing the bone, and still preserving some of its original shape. B. C. 1. 6. M. 37.

6. 508. Malignant Disease of the Upper Jaw.—Plaster cast of the face of an adult, distorted by the above.

A very large tumour growing from the left side has extensively involved the nose, mouth, eye, and cheek. Previously entered as "tumour from the antrum, removed by Dr Thomson." F. P. C. 2833.

6. 509. Malignant Disease of Upper Jaw and Malar Bone.—Plaster cast of the left side of a face, illustrating the above.

A large tumour, growing outwards from the malar bone, has involved the eye and cheek. F. P. C. 2834.

6. 510. Malignant Disease involving the Nose and Orbit.—Plaster cast of the face of an adult, illustrating the above.

A malignant tumour has grown into the orbit and projected also from the left side of the nose. Described formerly as a "polypus of the nose, projecting to the face." F. P. C. 2832.

6. 511. Malignant Disease of the Frontal Bone and Orbit.—Plaster cast of the face of an adult, probably a woman, illustrating the above.

A tumour has protruded the right eye-ball and projects on the forehead in the neighbourhood, extending beyond the middle line as far as the corner of the left orbit.

F. P. C. 2837.

6. 512. Malignant Disease of the Frontal Bone and Orbit.—Plaster cast of part of the right side of a face, illustrating the above.

A large fungating tumour has pressed down the right eye-ball, and has involved the right orbit and adjacent frontal bone.

F. P. C. 2838.

6. 513. Sarcomatous "Polypus" of Turbinate Bones and Upper Jaw.—Part of a right half of the skull of a young man, showing a large tumour growing into the nasal cavity and antrum, and causing absorption of bone by its pressure—in spirit.

"Mr W., a tall young man of a delicate form and sickly complexion, came to town in July 1813, to consult Mr J. Bell about a polypus in his right nostril. He was a farmer in East Lothian. He was attacked about eight months before with profuse bleeding from the nose, so profuse as to endanger life. Alarmed by this bleeding, he sent for assistance, but the surgeon assured him on this, as on several other occasions, that it was merely a bleeding from the nose, not connected with any other disease. As the bleeding each time increased, he was, by the time of his arrival in town, sickly, pale, and languid. He had that transparent yellow hue, which indicates great weakness from hæmorrhage, and is most noticed in the hæmorrhage during pregnancy and childhood.

"A large polypus could be felt occupying the left nostril. It in some degree affected his voice. Although the danger of his disorder was

strongly pointed out to him, he could not be persuaded to remain in town until he had seen his harvest got in. With this view he set out for his farm, where he remained for nearly two months, scarcely a day of which passed without his losing an alarming quantity of blood.

"On the 20th of September, when he returned, he looked an emaciated creature, his face ghastly and bloodless, his frame languid and exhausted, scarcely able to drag one limb after another.

"The tumour was now making its way in every direction through the carious bones. The right nostril was so occupied by the tumour that not a breath of air could be forced through it. The cheek was not swollen, but a small knobby tumour occupied the space between the ala nasi, infra-orbitary hole and canine tooth of the right side. It had forced its way through the walls of the antrum. A portion of the tumour had made its appearance in the form of a small papilla at the alveolar socket of the third grinder. This tooth had been pulled by a dentist, who imagined the disease to be toothache. The tumour likewise passed down behind the palate, obstructing in some degree his swallowing, and affecting a little his voice.

"Mr Bell first tried the caustic by passing it high into the nostrils; but finding that its roots were so protected by the walls of the antrum that there was no chance of reaching them, he made an oblique incision in the cheek, about three inches long, and found the tumour projecting through a hole in the antrum, the bones of which were completely carious. A probe could be passed through this hole across the cavity into the nostril, and down the throat. Mr Bell now tried to reach its roots by holding down the projecting lobe of the tumour, and directing the caustic towards the angle of the eye, inclining it a little towards the throat. In this, however, Mr Bell confesses to have entirely failed, for there intervened between this hole in the cheek and the roots so large a portion of the tumour, that, instead of passing over it, he transfixed it. By frequent applications of the caustic this portion was converted into a sac or bag, with a round mouth sufficient to admit the point of the thumb. A happy effect resulted from the applications, for, from the time that the caustic was first applied, the hæmorrhage never recurred.

"The pains which he suffered from the tumour were of the most rending and distracting kind, frequently darting through the head. He had frequent accessions of fever and diarrhœa. At each attack of fever he was confined to bed, and for some days tortured with sickness and retching. During the intervals of these paroxysms he was wont to sit cheerless and moaning over the fire, holding his head in his hands, resting on his knees. His countenance was now more pallid and death-like; his eyes heavy, sunk, and languid; his hearing much impaired, and his brain beginning to suffer. Stupor had already taken place.

"By slightly astringent injections thrown into the antrum, by occasional opiates and astringent mixtures, by soft nourishing diet, with wine and other cordials, a melancholy existence was dragged out, with many intervening scenes of great distress, until February 1814, when

suddenly the hæmorrhage which had been so long suppressed burst forth with great violence. It was immediately stemmed by wedging a sponge into the opening of the cheek. However, at midnight it again burst forth, and before any assistance could be rendered he was found extended, pale, and almost lifeless ; the whole face enormously swollen ; the opening in the cheek and the projecting tumour black, like gangrene, and exhaling an intolerable fœtor. For the two following days he lay in a state of stupor, and then expired.

"*Dissection.*—The walls of the antrum were completely carious. The tumour was seen arising in a flat membranous expansion from the upper spongy bones, becoming bulky and fleshy in the nostril, where it adhered to its floor, and occupied the top of the" (*sic*) "equally bulky and bag-like, where it extended across the antrum to the alveolar aperture, where the tooth had been drawn, and to the foramen which it had made near the infra-orbitary hole."

The tumour has apparently had its origin from the back of the ethmoid and the tissues in the neighbourhood of the sphenomaxillary fissure. From this point it has grown downwards into the naso-pharynx, and forwards through the antrum on to the cheek. Its surface is shreddy and irregular towards the nose, but more uniform towards the cheek. The tumour substance is for the most part soft and diffluent. The tumour has caused absorption by its mechanical presence, but it does not seem to have infiltrated the surrounding parts.

G. C. 968.

6. 514. Malignant Disease attacking Anterior Fossa.—Portion of frontal ethmoid and sphenoid bones—in spirit, showing complete absorption of the cribriform palate, by the growth of a tumour from below. B. C. 1. 6. M. 40.

6. 515. Malignant Disease of the Superior Maxilla and Nose.—Plaster cast of the right side of the face of a woman, illustrating the above.

There is a large swelling between the eye and the mouth, involving the side of the nose. Described originally as a "polypus of the nose, projecting to the face." F. P. C. 2831.

THE SKULL.

I. *Abnormalities in Growth or Development.*

Abnormalities in the Sutures.

6. 516. Absence of the Coronal Suture.—Skull of an adult—macerated, illustrating the above.

The sagittal suture is continued forwards as a permanent frontal suture to the nasal bones. There is no trace whatever of the coronal suture. The other sutures are quite distinct, and, from the appearance of the teeth, the person must have been about middle age. The skull is very round, and there is unusual breadth in the frontal region. The occipital bone projects backwards from the contour of the rest of the skull. On holding the skull to the light, it is seen to be very thin in many places, especially near the sagittal suture. G. C. 3483.

6. 517. Partial Obliteration of the Coronal Suture.—Skull—macerated, illustrating the above.

The sagittal suture is continued forwards into the frontal suture, which, however, is nearly obliterated for about one inch from the nasal bones, although it is distinct elsewhere. The end of the coronal suture has been obliterated from below the level of the temporal ridge on the right side, and from a little below the same ridge on the left side. The vault of the skull is unsymmetrical, slanting more obliquely on the right side, while it is rounded a little more than usual on the left, as if the skull, in a plastic state, had been flattened towards the left from pressure on the right side. The bridge of the nose is peculiarly wide and flat. G. C. 3484.

6. 518. Permanence of the Frontal Suture.—Skull—macerated, illustrating the above.

The skull is peculiarly heavy and massive, and the bony ridges are strongly marked. The frontal suture has persisted. The other sutures seem normal. G. C. 3485.

6. 519. Absence of the Sagittal Suture.—Skull-cap, apparently of a young person—macerated, illustrating the above.

The coronal suture is well marked, and is not yet completely ossified. There is, however, no trace of the sagittal suture upon the outside, and only a faint indication of its presence on the inside, a little behind the coronal suture. There are numerous dimples corresponding to the convolutions upon the inner surface. The whole bone is very thin, and is not distinguishable into plates. B. C. I. 3. M. 43.

6. 520. Absence of the Sagittal Suture.—Cast in glycerine and gelatine of the interior of the foregoing skull-cap, showing the form of the convolutions which must thus have fitted closely into the depressions on the bone. G. C. 3486.

II. *Changes produced by Conditions affecting the Growth and Nutrition of the Skull.*

a. Old Age.

6. 521. Senile Atrophy.—Skull and lower jaw of an old woman—macerated, illustrating the above.

This skull is from the same subject from whom No. 6. 6 and others were taken, and which illustrated an unusual form of senile decay. The changes in the skull, however, may be taken as illustrating those of ordinary senile decay.

The sutures on the vault are more or less obliterated. The bones are light, and in many places are atrophied. The outer walls of the orbits, for instance, are in great measure deficient, and the walls of the antrum are as thin as paper. The alveolar borders of the upper and lower jaws are greatly atrophied. The lower jaw is completely œdentulous; its angle is obtuse, and the narrowed mental foramen on each side opens at or near its upper border. On the upper jaw there are sockets for the roots or stumps of two incisors, and the bone near the sockets is less atrophied than it is elsewhere. The under surface of the skull is somewhat porous. The thickness of the

vault does not seem to have been altered. The "diploe" is for the most part unduly porous, although here and there it has been obliterated. G. C. 3225.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 522. Senile Changes in the Lower Jaw.—Lower jaw—macerated, illustrating the above.

The angle of the jaw is unusually obtuse even for an old person. The teeth must have dropped out long before death on the left side, but some sockets remain on the right side. The corresponding differences in the alveolar border should be noted. G. C. 3307.

b. Local Conditions affecting the Growth and Nutrition of the Skull.

6. 523. Skull Artificially Flattened on the Top in Childhood.—Skull probably of a South American Indian—macerated, illustrating the above.

Some of the South American Indian tribes have a fashion of bandaging their infants' and children's heads between two flat boards until the shape is permanently altered. This change in shape does not seem to affect the mental capacity of the individuals.

The skull has been flattened upon the top, and broadened out at the base and towards the back. The sutures are partially obliterated, as they might have been from advancing age in any case. G. C. 3588.

6. 524. Skull Artificially Flattened on the Top in Childhood.—Another similar specimen. From the worn appearance of the surface and crumbling character of the bone, this skull had probably been buried for some time before it was obtained. G. C. 3589.

6. 525. Skull Artificially Flattened at the Back in Childhood.—Skull of a young person—macerated, illustrating the above.

It is said to have come from Mount Lebanon. The alteration in shape is stated to be produced by bandaging the head and keeping the child on its back.

In this case the flattening is a somewhat vertical one at the back, between the occiput and the vertex. The result is an alteration in shape, almost the reverse of that seen in the previous specimen. The front and top parts of the head are unusually spherical, and the forehead rises abruptly and high above the face. G. C. 3592.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

6. 526. Absorption from Localised Pressure from without.—Skull-cap—macerated, illustrating the above.

There is an elongated area of absorption of the outer table, extending over the adjacent portions of the frontal and parietal bones. The portions of the sagittal and frontal sutures, included in the area of depression, are especially absorbed, so much so in the case of the sagittal suture that it presents an irregular cleft. The condition has doubtless been due to some form of pressure, of which unfortunately no history has been left. W. C. G. 26.

6. 527. Absorption of the Interior.—Portion of a fronta bone—macerated, showing an area of absorption on the inside, which has no doubt been caused by some form of pressure. B. C. 1. 7. M. 27.

6. 528. Absorption of the Interior.—Portion of an occipital bone, showing unusual depression of the torquelar Herophili, with several eroded pits just below it. Said to be from a tumour of the brain. G. C. 600. a.

c. Changes associated with alterations in the Nervous System.

(1.) *Hydrocephalus.*

6. 529. Hydrocephalic Skull-Cap.—Skull-cap apparently of a young person—macerated, illustrating the above.

It is of an unusually large size, but very thin. The sutures are still partly occupied by membrane. The inner surfaces of the frontal and lower part of the parietal bones are distinctly marked by cerebral convolutions. The divergent arrangement of the osseous spicula, and their mutual insertion at the sutures, are well seen. F. P. C. 625.

Presented by Professor JOHN THOMSON.

6. 530. Hydrocephalic Skull.—Greater part of the skull of a child—macerated, illustrating the above.

The bones of the skull are very thin and bulged out, especially in the frontal and parietal regions. The anterior fontanelle is still open. The other fontanelles and the sutures have closed, although they are, of course, still unossified.

F. P. C. 626.

6. 531. Skeleton showing Hydrocephalus and Spina bifida.—Skeleton of an infant—macerated, illustrating the above.

The skull is a remarkably fine specimen of the effects of hydrocephalus. The distension has drawn the skull into a more or less hemispherical shape, smaller however at the base, where the ossification has been most complete. The change is well seen in the frontal bones, where the orbital plates having been pulled upwards, and the frontal bones thrust outwards, the two have come to form part of a continuous sweep. The upper part of the child's head has been entirely membranous, and large spaces intervene between the parietal bones and those with which they should articulate, as well as between the upper

halves of the frontal bones. The ossification of the frontal bones is very imperfect; numerous patches of membrane show themselves in the course of the bone.

The spinal canal, from the fourth Dorsal Vertebra downwards to the upper part of the sacrum, is quite open, corresponding to a condition of extensive spina bifida.

B. C. v. 1. M. 20.

6. 532. Chronic Hydrocephalus.—Skull-cap of a boy, aged 5 years, cleaned, dried, and varnished, illustrating the above.

The sagittal suture and a large area at the position of the anterior fontanelle are occupied by membrane. The lower extremities of the coronal suture are close together, but are occupied by membrane. The lower part of the frontal suture is united by bone. G. C. 3063.

Presented by Bryan C. Waller, M.D.

6. 533. Remarkable Enlargement of the Skull from Hydrocephalus.—Skull of a woman, aged 21 years, macerated, illustrating the above.

"By Dr. John Campbell, one of the surgeons to the Royal Infirmary, by whom this skull was presented to the College, I am informed that the head of the person from whom this cranium was obtained was of the usual size at birth; that the child was, however, unable to manage it' (move it about?); "that about six months after she screamed violently for several days; and, in the meantime, the head enlarged so rapidly that in the course of eight or nine days it attained its greatest size. It was firmly ossified at 12; and she died aged 21. This woman, who had the free use of the hands, yet never could walk, but moved the legs by raising them over each other, was irascible; susceptible of pity; and she had a good memory, a sense of religion, and distinct ideas of right and wrong." From *The Edinburgh Medical and Surgical Journal*, vol. xxxviii., 1832. Account of a case of Chronic Hydrocephalus, by David Craigie, M.D., page 41.

The cranium is enormously enlarged in all directions, and measures thirty inches in circumference. It shows the usual

upward slant of the orbital plates and prominence of the frontal bones. The frontal suture is persistent, and all the other sutures are distinct, although they have apparently been closed. There are numerous wormian bones at various points. A large number are in the region of the lambdoidal suture, and at what should have been the posterior inferior angle of the parietal bone on each side. One large one occupies the position of the anterior fontanelle, and two others, lying to the right of the sagittal suture, form a continuous chain with those at the apex of the lambdoidal suture. F. P. C. 907.

6. 534. Chronic Hydrocephalus.—Plaster cast of the skull of a child, greatly enlarged by hydrocephalus.

The enlargement is greater on the left side, due apparently to a flattening of the skull from right to left. G. C. 3488.

6. 535. Advanced Hydrocephalus.—Plaster of Paris cast of the head and shoulders of a child who died of hydrocephalus.

There is an enormous enlargement of the skull, with numerous irregularities of the surface. The head, which measures thirty and a half inches in circumference, is, if anything, more hemispherical and less flattened at the top than is usual in such cases. B. C. v. I. M. 21.

6. 536. Hydrocephalus with Enormous Enlargement.—Plaster of Paris cast of a head, illustrating the above, showing Hydrocephalus.

The following inscription is on the back of the cast: "James Cardinal, born at Cogokstall, Essex, 27 years old."

The upper part of the skull is enormously enlarged, measuring thirty-six inches in circumference. It bulges somewhat towards the right side, and is flattened on the top.

G. C. 3487.

(2.) *Idiocy.*

6. 537. Small Skull in an Idiot.—Skull of an idiot, Robert Auld—macerated.

The skull is somewhat dolichocephalic, but is otherwise well-shaped. It is 18½ inches in circumference.

G. C. 939.

d. Changes due to conditions apparently constitutional, but more or less obscure.

For alterations in the skull of patients who had suffered from rickets in youth, see Nos. 25, 26, 27 *and* 28 *of this Series.*

6. 538. Abnormal Thickness of the Skull-cap.—Skull-cap—macerated and trefined, to illustrate the above.

The coronal and frontal sutures are nearly obliterated, and the bone is elevated round the parietal eminences, so greatly as to leave a groove in the position of the back of the sagittal suture. The bone is also thickened at the frontal eminences, but there the thickening seems to be as much internal as external. The condition is said to have been due to rickets.

B. C. 1. 3. M. 38.

6. 539. Abnormal Thickness of the Skull-cap.—Skull-cap—macerated and trefined, to illustrate the above.

The coronal suture is obliterated at its lower end on either side. The sutures are otherwise distinct. There is considerable thickening near the parietal and frontal eminences. There are irregular markings on the interior of the frontal bone, as if the dura mater had been unusually adherent. The condition is said to have been due to rickets. F. P. C. 593.

6. 540. Abnormal Thickness of the Skull.—Anterior half of

a calvarium—macerated and trefined, to illustrate the above.

There is a great but fairly uniform thickening of the frontal bone. The diploe is well marked.

B. C. 1. 3. M. 39.

6. 541. Abnormal Thickness of the Parietal Bone.—Left parietal bone of an adult—macerated and trefined to illustrate the above.

The thickening similar to that of the previous specimen except that the diploe is more condensed. B. C. 1. 3. M. 40.

6. 542. Abnormal Thickness of the Parietal Bone.—Portion of a right parietal bone—macerated and trefined to illustrate the above.

The bone is greatly thickened as in the previous specimen, and may have belonged to the same skull. G. C. 989.

6. 543. Great Thickening and Condensation of the Frontal Bone.—Portion of a frontal bone—macerated and sawn across to show its texture.

The section shows the bone to be uniformly condensed into an ivory-like consistence. The surfaces of the bone are roughened, but this may have been a *post-mortem* change. The condensation of this specimen resembles that produced by syphilis. B. C. 1. 3. M. 41.

6. 544. Irregularity of the Interior of the Frontal Bone. Portion of the frontal bone "from an elderly woman"—macerated, illustrating the above.

The frontal suture remains. Numerous irregular masses of compact bone are seen on either side of the superior longitudinal sinus. The condition is said to have been caused 'by a tumour on the brain." G. C. 600.

6. 545. Great Irregularity in the Thickness of the Skull.—Skull-cap—macerated and trefined, illustrating the above.

The specimen is very irregular in thickness, the irregularity being especially noticeable on the inner aspect. Near the longitudinal sinus there are several deep depressions resembling those produced by Paccionian bodies. On each side, a little behind the coronal suture, there is an elevation, due partly to thickening and partly to depression on the outer aspect. There is a small exostosis on the inside of the frontal bone near the front. B. C. I. 2. M. 49.

6. 546. Abnormally thin Skull-cap.—Skull-cap—macerated, illustrating the above.

The whole bone is remarkably thin. The digital impressions are well marked, especially on the inside of the frontal and lower part of the parietal bones. On the outer surface near the junction of the sagittal and coronal sutures there are two elongated areas where the surface is remarkably porous.

B. C. I. 3. M. 44.

6. 547. Deep Depression over the Sagittal Suture.—Skull-cap—macerated, illustrating the above.

The coronal and sagittal sutures are nearly obliterated, but a sulcus marks their position. This sulcus, which is deep on the sides of the coronal suture, is remarkably so at the vertex, where the bone is reduced to a thin shell, and is perforated at one spot. The bone is also thin, and transmits light in several other places, especially near the parietal eminences, and at the junction of the coronal and sagittal sutures.

B. C. I. 3. M. 42.

For Inflammatory Affections of the Skull, see 6. 86 ; 6. 200 *and* 201 ; *and* 6. 237 *to* 281. *For New Growth, see* 6. 400.

SERIES 7. DISEASES OF JOINTS.

I. ABNORMALITIES IN GROWTH OR DEVELOPMENT.

7. 1. Congenital Anchylosis of the Superior Radio-ulnar Joint.—Right radius and ulna—macerated, illustrating the above.

The bones are in the position of complete pronation. The upper end of the radius is fused with the adjacent part of the ulna, the head of the radius being represented by a small knot projecting from the outer side of the greater sigmoid cavity. There has therefore been no capitellar surface, and probably no capitellum. The bones are separated below. The shaft of the ulna is thin, and its bony ridges are sharp and not in their usual position.

This specimen is stated to have been taken from a child. From this fact, as well as from the absence of indication of previous disease, it has been considered a congenital malformation. B. C. II. M. 52.

II. CHANGES PRODUCED BY CONDITIONS AFFECTING THE NUTRITION OF JOINTS.

7. 2. Degeneration of Cartilage in Old Age.—Patella and rectus femoris tendon from an old person—in spirit, illustrating the above.

The central portion of the articular cartilage of the patella is broken up into fibrillæ, which resemble the pile of velvet.

This change is common in the joints of old people, and may exist without other appreciable alteration. A change almost identical with it is seen at an early stage of arthritis deformans, but is there associated with certain other changes. (See specimens illustrating arthritis deformans, itself a disease of advancing years.) W. C. H. 42.

7. 3. Changes in Cartilage from Disease and Abnormal Pressure.—Articular end of a right femur, arteries injected with coarse injection—in spirit, illustrating the above.

"The patient had suffered amputation of leg of that side some time before death, and the knee was in a bent state."

The cartilage at the lower part of the inner condyle and the outer part of the outer condyle is completely absorbed, and at other places it is thinned, probably owing to pressure of the soft parts upon the exposed articular surface. W. C. H. 64.

Changes due to Affections of the Nervous or other Systems.—Specimens wanted.

III. INFLAMMATION OF JOINTS.

1. *Where the Inflammation has been due to pus-forming organisms.*

a. Where the organisms have reached the bone or synovial membrane through the circulation.

7. 4. Acute Suppurative Inflammation of the Shoulder.—Right shoulder-joint of a woman, opened from above—in spirit, illustrating the above.

Six weeks before admission to the Royal Infirmary, the patient, Betty Caddell, received a fall, which injured the right shoulder. It continued painful and much swollen until the period of her admission, when the whole extremity was œdematous. When the swelling of the shoulder was pressed, a gurgling sound was produced, as of air passing through a

fluid. On making a small incision into the abscess, much gas, smelling of sulphuretted hydrogen, came away, with a thin, fœtid, greenish-coloured pus. Two days after admission two incisions were made into the abscess in the shoulder. The joint could be felt exposed, by a large ulcerated opening through the capsular ligament. A very large abscess was opened soon after in the lower part of the arm, and greenish matter, thin and fœtid, was discharged.

The opening into the upper part of the joint has been artificially enlarged. The cartilage at the margin of the articular surface has disappeared, leaving the bone exposed below. An early stage of the same process is seen at the middle of the head of the humerus. G. C. 1199.

Presented by Adam Hunter, F.R.C.S.E., **1828.**

7. 5. Suppurative Osteo-myelitis of the Head of the Humerus, involving the Shoulder-joint.—Upper end of the left humerus of a child—in spirit, illustrating the above.

"The patient was a fine little boy of two years. While amusing itself at its mother's foot about two months previously, it stumbled, and was falling forward, when the mother caught hold of the left arm, by which indeed she prevented the fall, but unfortunately injured the shoulder-joint severely. The joint soon after swelled and became inflamed, and an abscess forming, considerable discharge took place. The donor of the preparation, when first consulted, probed the sore, and found the bone carious, but made a free incision in the hopes that nature would effect a cure. This did not take place, and the child's health appearing to be rapidly suffering, the removal of the bone was determined on. The case seemed doing well for a few days, but a violent attack of erysipelas supervened, from which he never recovered, but died in about a fortnight after the removal of the carious bone.

"The internal structure of the bone was found nearly destroyed. A few small pieces were found floating in the cavity. The cartilages of the joint were found during the operation to have been partially anchylosed. An exceedingly small quantity of blood was lost by the patient during the operation."

The specimen shows a large cavity in the head of the bone, containing a loose, necrosed fragment. G. C. 1199.

Presented by Adam Hunter, F.R.C.S.E., **1828.**

7. 6. Suppurative Osteo-myelitis of the Femur, involving

the Knee-joint.—Lower end of a right femur, with the articular end of tibia—in spirit, illustrating the above.

"From a patient in the Royal Infirmary, 26 years of age. Seven years previously an abscess formed and discharged at the outside of the thigh, when several portions of the bone came away. Two months before amputation the bone became affected with severe pain. After his admission to the Hospital, which was five weeks after the commencement of this attack, several ounces of purulent matter were discharged from the outer and upper part of the knee. His general health was much affected. He had a quick pulse, flushings, diarrhœa, and morning sweats. Amputation was performed; these subsided, and he recovered, so that he left the Hospital well in four weeks."

The specimen shows considerable thickening on the surface of the lower end of the femur, with, in addition, on the back and outer sides, apertures leading into the bone, and on the outside a small necrosed fragment in process of separation. The articular surface of the femur shows several patches of bare necrosed bone, like islands in the cartilage; these, though unchanged on the surface, seem loosened from below. The changes on the patella are superficial.

This seems to have been primarily a case of osteo-myelitis, extending afterwards to the joint. G. C. 2232.

Presented by ALEXANDER WATSON, F.R.C.S.E., **1838.**

7. 7. Suppurative Osteo-Myelitis of the Femur, involving the Knee-joint.—Lower end of the right femur of a young person—macerated, showing changes similar to those in the previous specimen.

This one was originally entered in the Catalogue as a case of white swelling, but it is more like the above. On the popliteal surface of the femur, white necrotic fragments of bone are seen, and below them the original bone is rarefied, while higher up, and extending round to the front, there is a considerable development of new periosteal bone. The articular surface on the inner condyle of the femur shows a bare necrotic patch, surrounded by rarefied, partially absorbed bone tissue. One or two roughened patches are seen on other parts of the articular surface. G. C. 372.

7. 8. Suppurative Osteo-Myelitis of the Femur, involving Hip-joint.—Left innominate bone and upper end of femur of a young person—macerated, illustrating the above.

The angle which the neck of the femur forms with the shaft is very obtuse. At and below the level of the small trochanter the bone is irregular in shape and condensed, while, on the front of the head and neck and great trochanter, the bone is greatly rarefied (carious), and the articular surface of the femur in many places is rough and bare. Below the outside of the great trochanter a sinus runs upwards into the bone.

This condition has all the appearance of having begun as an acute osteo-myelitis of the upper end of the shaft. The disease has evidently involved the hip-joint, producing rarefactive ostitis in the head and neck, and has led to new bone formation below the level of the trochanter. G. C. 631.

b. Where the pus-forming organisms have reached the joint directly through wounds.

7. 9. Septic Inflammation of the Hip-joint.—Upper end of a left femur, with the soft parts outside the joint dissected off —in spirit, illustrating the above.

The patient, a young man, had been treated in the Royal Infirmary, Edinburgh, for a large abscess in the left inguinal region, above the situation of the inguinal ring. This was opened, and much matter was discharged. He was beginning to improve, when seized with sudden pain in the inside of his thigh and knee. Symptoms of septic absorption, indicated by fever, sweating, and afterwards delirium, came on, and he died exhausted in about a fortnight.

This was probably a psoas abscess, which had pointed in the abdominal wall, and after having been opened, had turned septic and communicated with the hip-joint.

"The ligamentum teres was absorbed, and the cartilage covering the head of the bone, and also that lining the acetabulum, could scarcely be said to exist." The greater part of the bone is bare of cartilage, and the bone below is rarefied. G. C. 1101.

Presented by Sir GEORGE BALLINGALL.

7. 10. Septic Inflammation of Knee-joint.—Right knee-joint laid open—in spirit, illustrating the effects of the above.

The patient, a man aged 35, was admitted to the Royal Infirmary, Edinburgh, on account of extensive abscesses of the leg and thigh from erysipelas. Purulent effusion afterwards took place into the knee-joint; hectic fever and diarrhœa supervened. Amputation was performed, and he recovered.

The cartilage has disappeared round the edges of the articular surface of the lower end of the femur. The bone from which the cartilage has disappeared is smooth in some places, while at others, *e.g.* at the inner condyle, it is rarefied.

G. C. 2233.

Presented by ALEXANDER WATSON, F.R.C.S.E., **1838.**

7. 11. Septic Inflammation in the Knee-joint.—Section of an injected knee-joint—in spirit, illustrating the above.

The patient was an elderly man, who had suffered from what seemed to be hydrops-articuli, *i.e.* a chronic distension of the knee, the nature of which, however, was obscure—perhaps rheumatic, possibly tubercular. The joint was aspirated, and a clear fluid drawn off. Soon afterwards the joint inflamed and the fluid then drawn off was purulent. Suppuration extended into the thigh and calf, and amputation became necessary. The patient developed phthisis, and lingered for many weeks with a chronic suppuration in the thigh. He eventually sank from exhaustion.

The articular surface of the femur is bared of cartilage and rarefied (carious) where it was in contact with the tibia. At other places the cartilage is loosened, and has been falling off, while at others it is vascular and has been injected. The articular surface of the tibia is quite bare, and the exposed bone is soft and inflamed. The articular surface of the patella is injected. The synovial membrane is thrown out into soft vascular processes. Caseous glands are seen in section in the popliteal space. Probably the joint in this case became septic after the aspiration.

G. C. 3375.

Presented by A. G. MILLER, F.R.C.S.E., **1892.**

7. 12. Septic Inflammation in the Ankle-joint and Lower

End of Tibia.—Lower end of a left tibia—macerated, illustrating the above.

There has been rarefactive ostitis of the back and inner parts of the lower end, and the cancellous tissue is exposed below part of the articular surface. A considerable crust of new periosteal bone extends up the shaft on the inner and posterior aspects.

B. C. II. M. 58.

7. 13. Septic Inflammation in Ankle-joint, following Injury.—Lower end of a left tibia—macerated, illustrating the above.

The patient had fallen from a great height and so alighted on the ground as to injure his ankle-joint. The leg was amputated some time after the accident for what was supposed to be a scrofulous affection of the ankle-joint, but which has probably been suppuration owing to the septic disease of the bone.

The lower end of the tibia has evidently been split vertically into an anterior and posterior portion. The latter, carrying the malleolus, is on a higher level than the former, and there is a fissure between them. A portion of the original articular surface remaining on the anterior fragment has evidently necrosed, and has been in process of separation, for it only remains attached now by a small stem on the inner side. The rest of the articular surface is carious. The surface of the lower end, especially at the back, is covered with irregular newly-formed nodules.

B. C. II. M. 38.

7. 14. Septic Inflammation of the Elbow, following Compound Fracture of the Olecranon.—Bones forming the left elbow of an adult—cleaned and mounted in spirit, illustrating the above.

From a patient whose arm was amputated three weeks after receiving a compound fracture of the olecranon.

The cartilage on the trochlear surface of the humerus is almost enirely destroyed, and is represented by only a few loose tagts. The cartilaginous surface of the capitellum is deficient at the edge. The olecranon process is wanting, and

the remainder of the ulnar articular cartilage has at some places disappeared, while at others it hangs loose. The margin of the articular cartilage of the radius has been lost, and the cartilage on the cup-shaped depression is partly detached. The bone from which the cartilage has disappeared is covered by granulations—now altered by the spirit. G. C. 1251.

7.15. Septic Inflammation of the Elbow-joint, probably after Injury.—Upper end of a left ulna, olecranon wanting —macerated, illustrating the above.

The articular surface is scarcely recognisable from its toughness and irregularity. Much new bone has been thrown out upon the inner and posterior aspects of the upper end and for some way down the shaft.

In this case septic inflammation has probably followed compound fracture of the olecranon. B. C. I. M. 55.

* KNEE-JOINT.

2. *Where the Inflammation has been caused by Tuberculosis.*

a. Changes primarily in synovial membrane.

7. 16. Tubercular Synovitis.—Glycerine and gelatine cast of parts removed in an excision of the knee.

The cast shows a mass of pulpy, œdematous, synovial membrane round the patella, encroaching on the margin of the cartilage. Similar characteristics are seen round the upper end of the tibia, where the two semi-lunar cartilages were covered by gelatinous material. On the femur the growth of the vascular synovial membrane between the surface for the patella and that for the tibia has separated the joint into two, one cavity above and one below the ligamentum mucosum and the ligamentum alaria. G. C. 3806.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

* The knee-joint is taken first, because the various stages of the disease are better illustrated in this Museum by the specimens of that joint than by those of any other.

7. 17. Tubercular Synovitis.—Left knee-joint, opened from the front—in spirit, illustrating the above.

An encroachment of the diseased synovial membrane has taken place upon the cartilage of the femur, especially opposite the ligamentum mucosum and the ligamenta alaria, and round the patella, whose cartilage is also at one place ulcerated through. The interior of the synovial membrane has numerous delicate fringed processes hanging from it. G. C. 541.

7. 18. Tubercular Synovitis.—Right knee-joint, laid open from the front—in spirit, illustrating the above.

There has been an encroachment of the diseased synovial membrane upon the trochlear surface from above and laterally, and also, as in the previous specimens, in the position of the ligamentum mucosum and the ligamenta alaria. Similar to the last also, but more advanced, is the affection round the patellar cartilage.

It should be remembered that what now appear to be layers of lymph covering the cartilage have been in the recent condition vascular granulations (see 7. 16 and the next specimens). G. C. 2449.

Presented by J. Bell Pettigrew, F.R.C.S.E.

7. 19. Tubercular Synovitis.—Section of an injected knee-joint —in spirit, illustrating the above.

The patient, a lad of 15, had first felt pain in the joint in November 1886. This was followed by a swelling, which began on the outside, and spread all over the joint. An abscess was opened in March 1887, and healed in four months, after which he went about quite well, except that a little swelling still remained. In March 1888 the disease again broke out; an abscess formed, and continued to discharge after having been opened. The joint gradually grew worse, and the limb was amputated in October 1888. At no time were there starting pains at night. The pain was never great. The chief complaint was swelling and stiffness.

The injected synovial membrane is seen encroaching on

the articular surface of the femur at the margins, and opposite the ligamentum mucosum and the ligamenta alaria. The interior of the epiphyseal end of the shafts of the femur and tibia is in each case fatty, and when fresh was of a brown chocolate colour. The interior of the epiphyses themselves seems healthy. Much fibrous tissue has been formed around the joint, and had anchylosed it, thus accounting for the absence of starting pains. The skin on the side shows marks of a previous ulcer formed after one of the abscesses had burst.

G. C. 2812.

Presented by A. G. Miller, F.R.C.S.E.

7. 20. Tubercular Synovitis.—Section of an injected knee-joint —in spirit, illustrating the above.

For some months the patient had been treated with rest by splints, and also for a time in bed. As the disease was not checked, the joint was opened and scraped. Improvement was only temporary. The resulting sinuses refused to heal, and as the patient's general health began to fail, amputation was performed.

When the section was first made, the shafts of the tibia and femur next to the knee-joint epiphyses were congested, and of a deep chocolate colour, and the bone was softened and fatty. The texture of the epiphyses seemed healthy.

The cartilaginous surfaces are being attacked in the usual way. The periosteum was easily stripped off, and was detached in making the section.

G. C. 3108.

Presented by P. H. Maclaren, F.R.C.S.E.

7. 21. Tubercular Synovitis.—Sections of an injected right knee-joint—in spirit, illustrating the above.

The injection has passed well into the tibia, but imperfectly into the femur and synovial membrane.

The cartilaginous surface of the femur on the upper (inner) section is entirely covered by granulations, very few of which

are seen on the other half (below). The fatty condition of the epiphyseal end of the shaft of the femur is very marked, and the same may be seen on the tibia, but to a less extent. As in the previous specimens, the condition of the epiphyses seems healthy, while that of the adjacent ends of the shaft is fatty and of a dark brown colour. G. C. 3182.

Presented by A. G. Miller, F.R.C.S.E.

7. 22. Tubercular Synovitis, following Partial Dislocation.—Parts of a knee-joint removed by excision—in spirit, showing slight outward dislocation of the tibia, with extensive destruction of the cartilaginous surfaces.

Four years before admission to the Royal Infirmary, Edinburgh, the patient, a lad aged 20, in jumping into a cart, had struck his knee on the tram. Displacement occurred at once, and remained in spite of repeated attempts to restore it.

Before operation the joint was swollen, slightly flexed, tender to the touch, and painful when moved. The tibia was displaced outwards and slightly rotated backwards.

At the operation the articular surfaces were found to have adhesions in process of formation. These had to be broken down to allow of the excision. In this case tubercular synovitis distinctly followed the injury.

The articular cartilages of the joint have been entirely replaced by irregular granulations, now blanched and shrivelled by the spirit. G. C. 2890.

Presented by A. G. Miller, F.R.C.S.E.

7. 23. Tubercular Synovitis, following Partial Dislocation.—Papier-maché cast of knee before operation, from which the foregoing specimen was taken, to show the swelling of the joint and the lateral displacement of the tibia. G. C. 2891.

Presented by Charles W. Cathcart, F.R.C.S.E.

7. 24. Tubercular Synovitis destroying Cartilage.—Lower end of a right femur and patella removed by excision—in spirit.

The articular surface of the femur is greatly altered. At the margins of the trochlear surface, and at the site of the ligamenta alaria, the cartilage is replaced by the encroaching synovial membrane, which has spread over it. Upon the front of the trochlear surface, and upon the under surface of the inner and slightly also of the outer condyle, the cartilage has been undermined, and lies in loose flakes and tags.

The cartilaginous surface of the patella has also suffered both from the encroachment and the undermining forms of invasion. G. C. 2843.

Presented by Professor T. ANNANDALE.

7. 25. Tubercular Synovitis, with Peri-articular Abscess.—Right knee-joint injected with vermilion, and laid open—in spirit, illustrating changes chiefly in the outlying portions of the synovial membrane.

The upper and inner part of the trochlear surface of the femur shows the gradual growth upon it of the vascular synovial membrane, but the rest of the articular surface of the femur is comparatively unchanged, except for a narrow band of vascularity between the outer condyle and the trochlear surface. The upper part of the synovial membrane has been much affected. It has been caseous, and at the inner side has broken down, to form a tubercular abscess, which has burrowed under the vastus internus, and is now seen to contain the curdy and flocculent material, characteristic of tubercular abscesses. G. C. 198.

Presented by Professor JOHN THOMSON.

7. 26. Tubercular Synovitis, with Abscesses bursting into

the Joint.—Left knee of an adult—injected and in spirit, laid open by turning up the patella, illustrating the above.

The articular cartilages have been attacked round the margins here and there, especially upon the inner condyle, the outer part of the trochlear surface of the femur, and on the patella. The bone in these places is exposed, and the cartilage either removed entirely or partly detached. The synovial membrane is involved all round, and two sinuses, one above either condyle, communicate between the joint and the skin. The femur is thickened by a deposit of new periosteal bone round the shaft. F. P. C. 2965.

7. 27. Abscess extending from Tubercular Synovitis.—Section of the lower end of a left femur, with part of the wall of an abscess above the articular surface—in spirit.

Probably this has been a tubercular extension into the bursa under the subcrureus. B. C. II. M. 22.

7. 28. Tubercular Synovitis, with Abscesses and Destruction of Cartilage.—Right knee-joint of a child—injected with vermilion, laid open from the front—in spirit, illustrating the above.

The articular cartilage of the femur has been entirely destroyed, except upon a narrow area round the edge. The trochlear surface and that of the inner condyle is covered with granulations, and the under surface of the outer condyle is irregularly hollowed out. On the outer aspect of the femur the walls of an abscess cavity are shown communicating in two places with the interior of the joint, as well as with another abscess beneath the subcrureus muscle.

This illustrates the mode of formation of these abscesses. Portions of the thickened, gelatinous, synovial membrane caseate, soften, and run together to form an abscess. This

may burst at once into the joint, and rapidly disseminate the disease, or burrow away from the joint, burst externally at a variable distance from it, and only after some time, if at all, communicate with its interior. B. C. II. M. 16.

7. 29. Tubercular Synovitis of Knee-Joint, with Destruction of the Articular Surfaces.—Cast in gelatine and glycerine of the front of a left knee which was in the above condition.

The patient, Mary W., aged 25, had complained first of her knee, six years before. She was then a field worker. Under rest and blistering the symptoms subsided, but reappeared when work was renewed. This occurred several times, the longest interval of health being for a year in 1884, and again in 1886. In December 1887 pain and swelling became much worse. A Thomas splint then tried was found of no use, and in April 1888 she came to Dr John Duncan's wards with the knee in the condition indicated by the cast. A puffy swelling was present also at the outer part of the ankle-joint. This, together with the patient's wish, determined Dr Duncan to amputate rather than to excise.

The cast shows the uniform globular swelling of the joint characteristic of tubercular synovitis. G. C. 2789.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

7. 30. Tubercular Synovitis of the Knee-Joint, with Destruction of the Articular Surfaces.—Cast in gelatine and glycerine of the same knee, laid open after amputation.

The patella is thrown down over the tibia. There had been recent suppuration within the joint. The only portions of articular cartilage remaining are seen on the outer condyle and the outer half of the trochlea of the femur. The rest of the articular cartilage is replaced partly by recent granulations, indicated by the strong colour, partly by fully formed fibrous tissue, which covers the articular surface of the patella and the upper part of the trochlear surface of the femur. A plug of fat occupies the inter-condyloid notch; over the surface of the

inner condyle a thin layer of gray granulations just covered the bone.

The cast therefore illustrates removal of articular cartilage, and substitution of vascular granulations in its place. These may (1) develop on into bone (osseous anchylosis); or (2) into fibrous tissue (as in this case at certain parts, where it formed a fibrous covering for the articular surface); (3) break down into suppuration; or (4) continue to invade the bone.

In this case the fibrous tissue covering part of the condyles was the effect of the organisation of granulations formed at previous attacks. In places the granulations were recent.

G. C. 2789. a.

Presented by JOHN DUNCAN, F.R.C.S.E.

7. 31. Tubercular Synovitis of the Knee-joint, with Destruction of the Articular Surfaces.—Inner half of the knee from which the foregoing casts were taken—in spirit.

The destruction of cartilage and its replacement by granulation and fibrous tissue—now indistinguishable from the blanching and shrivelling of the spirit—are well shown. The bone on the line of section is quite sound. G. C. 2789. b.

Presented by JOHN DUNCAN, F.R.C.S.E.

7. 32. Tubercular Synovitis of the Knee-joint, with Destruction of the Articular Surfaces.—Outer half of the same knee-joint—macerated, to show the condition of the bone.

The articular surface of the femur has at several places lost its firm, bony shell, and the cancellous tissue is exposed. A similar change is seen on the articular surface of the patella and femur. The adjacent texture of the bone is atrophied and light. G. C. 2789. c.

7. 33. Tubercular Synovitis, involving the Cartilages and the Bone.—Right knee-joint of a young person, laid open—in spirit, illustrating the above.

The trochlear surface of the femur and the corresponding surface of the patella are occupied by a mass of new tissue—probably blanched fibrous and granulation tissue—which has extended down into the bone. The rest of the articular surfaces are altered, but to a much less extent. The following is Sir Charles Bell's note, viz., "Specimen of disease of the synovial membrane, from a patient of Mr Brodie's. This is the state of the joint in which I pass the Seton."

B. C. II. M. 15.

7. 34. Tubercular Synovitis, involving the Cartilage and Bone.—Cast—in gelatine and glycerine—of the articular surfaces of a knee-joint, laid open, after amputation, for the above.

David H., aged 42, at the age of 16, was attacked with excessive vomiting and sickness, followed by pain and swelling of the knee. This ended in an abscess near the knee, which was opened. It closed and re-opened, when it discharged some pieces of bone. This opening and closing went on for about fourteen years, when a large piece of bone was removed, probably from the tibia. He then remained apparently well for about twelve years. Two and a half months ago he had pains in his leg, which were considered rheumatic. This was followed by swelling of the knee, and he was admitted to the Royal Infirmary. An abscess over the near condyle of the femur was opened but soon turned septic, and other abscesses formed round about and burrowed in the calf of the leg. As his constitution was suffering and his knee getting worse, the leg was amputated.

The cast shows that the articular cartilage is left only at one place, viz., on the outer half of the trochlear surface. The greater part of the rest is covered by vascular granulations, but upon the inner condyle are seen two patches of what was bare, smooth, necrotic bone. The articular surface of the tibia is covered by vascular granulations.

The cicatrix of the former abscess is seen round the head of the tibia.

The early history of this case is more like that of acute suppurative osteo-myelitis, but the later condition is evidently tubercular, although complicated by sepsis. G. C. 3239.

7. 35. Tubercular Synovitis, involving the Cartilage and Bone.—Articular ends of the femur and tibia—in spirit—from which the previous cast was taken.

The specimen shows the granulations—now shrivelled and blanched—covering the greater part of the articular surfaces; also pockets in the synovial membrane of the femur, containing tubercular granulations, and extending upwards towards the thigh. The section has been carried through the necrosed fragments of the inner condyle, and through the inner head of the tibia. There is no evidence of former disease in the head of the tibia. G. C. 3240.

Presented by A. G. Miller, F.R.C.S.E.

7. 36. Tubercular Synovitis, involving the Cartilage and Bone.—Portions of the inner condyle and head of the tibia of the previous specimen—sawn off and macerated.

The saw has been carried through the smooth, bare bone on the inner condyle of the femur. The underlying interior of the bone shows little or no change.

In the tibia the section has passed through the part formerly affected, but, as in the non-macerated part, there is no sign of previous disease. G. C. 3341.

Presented by A. G. Miller, F.R.C.S.E.

7. 37. Tubercular Synovitis of the Knee, with Patch of Necrosis on the Inner Condyle.—Lower end of a left femur —in spirit—section sawn out, to illustrate the above.

Mrs L., aged 41, was admitted to the Royal Infirmary, Edinburgh,

on 26th October 1891, complaining of a jumping pain in her left knee, when going to sleep. She had no pain when sitting with her leg hanging, but when lying down had pain. She first felt a pain in her knee fourteen years ago, without any apparent cause. It has gradually increased, especially during the last two years. The knee has been blistered with but little effect. The knee is now bent at an angle of 130°, and the leg is everted. There is a wasting of muscles above and below the joint, and the circumference of the joint is two inches greater than on the sound side. The knee was excised on 30th October. The wound healed slowly, leaving a sinus, which was gouged out on 5th January 1892.

The necrosed piece was denser than the rest, and on section, when fresh, showed the following points, viz., near the articular surface a layer which was of an opaque yellow colour; next to that one of a more clear, bluish, translucent colour; then the line of demarcation, with soft granulation tissue, and beyond that the cancellous bone.

The lower piece of the specimen has been macerated to illustrate the rarefied condition of the bone. The upper part of the articular surface is covered by shrivelled granulations and has been irregularly eroded. G. C. 3341.

Presented by A. G. Miller, F.R.C.S.E.

7. 38. Tubercular Synovitis of the Knee, with Necrosed Patch on the Inner Condyle.—Macerated section of the portion of the inner condyle which contained the necrosed portion in the previous case. The condensed character of the necrosed piece, the line of demarcation round it, and the more open character of the cancellous tissue beyond, can be recognised. G. C. 3342.

Presented by A. G. Miller, F.R.C.S.E.

7. 39. Tubercular Synovitis, with Destruction of Cartilage.—Left knee-joint of a young woman laid open from the front—in spirit, illustrating the above.

The following account is from a clinical lecture by Sir

George Ballingall, delivered to the Students of Surgery in the Royal Infirmary, Edinburgh, at the conclusion of the winter course for 1828-1829.

"This poor girl," Helen Coghill, "was admitted on 8th October, and the following report entered in the Journal: 'The left knee is swelled, hot and painful; the patella is movable, but the slightest movement or pressure upon the bone is attended with very severe pain in the condyles of the femur. The limb is kept constantly in the extended posture. Pulse natural, tongue clean, belly regular. States that her knee was first inflamed ten years ago in consequence of a fall, from the effects of which she never altogether recovered. Eighteen months ago, after a similar accident, the inflammation was much aggravated, and has been more severe than ever during the last seven weeks. *Applic. Herud.* xx. *genu.*'

"Subsequent to this various remedies were employed, but without any very obvious or permanent relief, and on the 3rd November I find the following report entered in the Journal:—

"'Took three grains of opium and slept a little; pulse 124; tongue slightly furred; no sweating; bowels regular; appetite rather worse. Previous to her admission she had been cupped, and leeches had been applied with benefit. Since her admission she had been leeched three times, and cupped three times to a large amount, and has also had a blister applied, but the disease has certainly become worse.'

"Leeches were again applied, and were followed at a short interval by the use of the moxus on either side of the patella; but none of the remedies seemed to check the progress of the disease. The pain was so exquisite, upon any attempt to move the limb, as to preclude any satisfactory examination of the joint. Her appetite failed; she was occasionally distressed with nausea and retching, and her bowels became greatly disordered. In short, her sufferings were so severe as to induce her to seek relief by the removal of the limb; but when this was seriously proposed to her, she requested permission to consult her friends on the subject; and it was not until the 5th of December that she made up her mind to the operation, which was immediately performed. She seemed relieved, even before the operation was completed. She took seventy drops of laudanum, and slept a little on the following night. She left the Hospital on the 3rd of January.

"On laying open the joint, after the amputation of the limb, the disease in this poor girl's knee was found to have made very extensive ravages. The preparation, which I now again exhibit to you, shows that the cartilages covering all the bones of the joint, with the exception of that on the inner condyle of the femur, were either entirely destroyed or floating loose, being completely detached from the bones."

In most places the articular surfaces are covered by granulations, now blanched and shrivelled by spirit, but detached pieces of cartilage are seen here and there, and on the inner

condyle there is a piece of the smooth necrotic bone so often seen in advanced cases of tubercular arthritis. G. C. 1231.

Presented by Sir GEORGE BALLINGALL.

7. 40. Tubercular Synovitis involving the Bone.—Cast in glue and glycerine of a knee-joint laid open after amputation for the above.

The patient, a boy T.M., aged 14, had been troubled for three years before admission to the Royal Infirmary, Edinburgh, with his knee. For the last two years there had been swelling, but very little pain. When admitted, seven weeks before the amputation, the joint was uniformly enlarged with a large peri-articular abscess on the inner side. For a time after this abscess was opened, the patient did well, but the wound became septic. The temperature then rose to 103° F. and kept there. Intense pain accompanied any attempt at movement, and there were starting pains at night. Hæmaturia set in. Before the amputation these symptoms had somewhat subsided under free drainage, and daily syringing out the knee-joint with 1·1000 corrosive sublimate lotion.

When laid open after the amputation the joint was found to contain pus. The articular surfaces were eroded, leaving the bone bare, but not soft. At places numerous necrosed fragments lay loose on the surface of the bone, and a cavity existed in the head of the tibia.

The cast shows the narrow rim of cartilage which was left in the femur and the patella, and the irregularity of the rest of the surface covered by granulations. G. C. 2801.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

7. 41. Tubercular Synovitis involving the Bone.—Sections in spirit of parts of the knee of which the foregoing specimen is a cast.

The now shrivelled and blanched (by the spirit) granulations on the end of the femur are well seen, also erosions by granulation tissue into the head and shaft of the tibia. An external opening into a large posterior abscess is indicated by a

red glass rod, while green and blue rods show where the same abscess communicated with the diseased joint and the bone.

G. C. 2801. a.

Presented by P. H. MacLaren, F.R.C.S.E.

7. 42. Tubercular Synovitis involving the Bone.—Portion of the head of the tibia from the previous case—macerated.

It shows the eroded spaces on the head of the tibia. There is no periosteal new bone. G. C. 2801. b.

Presented by P. H. MacLaren, F.R.C.S.E.

7. 43. Advanced Tubercular Synovitis in a Child.—Section of the knee-joint of a child—in spirit, to illustrate the above.

The bones were softened and the knee flexed. The specimen, however, does not show much now. G. C. 2168.

Presented by Benjamin Bell, jun., F.R.C.S.E.

Series of macerated bone preparations from Tubercular knee-joints, illustrating changes secondary to disease in the synovial membrane.

7. 44. Invasion of Articular Surfaces from Tubercular Synovitis.—Bones of a left knee-joint from a case of tubercular synovitis.

The articular surface has been attacked in the neighbourhood of the inter-condyloid notch, and at the back of both condyles, the outer especially. The bone is somewhat roughened on the side of the inner condyle, and slightly eroded upon the front of the outer condyle, but there is little change in the substance of the bone itself, which is very dense and heavy. The articular surface of the tibia is scarcely altered, but at places the bone is somewhat roughened.

G. C. 733.

Presented by Sir George Ballingall.

7. 45. Invasion of Articular Surfaces from Tubercular Synovitis.—Articular end of a right femur.

The cartilaginous surface is bare and rough, except at one place in front of the inner condyle. Some new periosteal bone has formed above the articular surfaces, and there has been a small erosion at the attachment of the popliteus muscle.

B. C. II. M. 32.

7. 46. Invasion of Articular Surfaces from Tubercular Synovitis.—Lower third of a left femur.

There is roughness from rarefaction on the greater part of the articular surface. New periosteal bone has been formed above the articular end. F. P. C. 766.

7. 47. Invasion of Articular Surfaces from Tubercular Synovitis.—Lower end of a left femur.

The articular surface is almost entirely rough from rarefaction and erosion. New periosteal bone has been formed in the neighbourhood. F. P. C. 767.

7. 48. Invasion of Articular Surfaces from Tubercular Synovitis.—Articular ends of a left femur and tibia.

The articular surfaces of both bones are everywhere rough from rarefaction, and, at many places, are eroded. Very little new periosteal bone has been formed in the neighbourhood.

F. P. C. 773.

7. 49. Invasion of Articular Surfaces from Tubercular Synovitis.—Upper third of a left tibia.

The articular surface, especially of the inner tuberosity, is

rough from rarefaction. A considerable development of new periosteal bone has taken place round the inner tuberosity.

F. P. C. 764.

7. 50. Invasion of Articular Surfaces from Tubercular Synovitis.—Upper ends of a right tibia and fibula.

The articular surface of the tibia is greatly rarefied, and on the inner side is somewhat eroded as well. F. P. C. 768.

7. 51. Invasion of Articular Surfaces from Tubercular Synovitis.—Upper end of a right tibia.

The outer and a small portion of the inner articular surface remains, but the remainder of the upper surface of the bone is rough from rarefaction and erosion. Some new bone has been formed round the inner tuberosity. F. P. C. 777.

7. 52. Invasion of Articular Surfaces from Tubercular Synovitis.—The articular ends of a right femur and tibia—showing extensive alterations at and near the articular surfaces.

Portions of the cartilaginous surface remain on the outer and inner condyles of the femur, the remainder of the adjacent bone being rarefied and eroded. The articular surfaces of the tibia are more extensively eroded, especially on the outer side, where there is a deep excavation. A crust of new periosteal bone has formed round the articular ends of both bones, no doubt from a septic condition of the joint. The original texture of both bones is much lightened. F. P. C. 778.

Presented by Professor JAMES RUSSELL.

7. 53. Invasion of Articular Surfaces from Tubercular Synovitis.—Upper end of a left tibia greatly altered by tubercular disease.

A small portion of the outer articular surface alone remains, the rest of the upper surface of the bone is eroded and rarefied. There is a deep excavation with a septum at the bottom of it on the front of the inner articular surface, and a small excavation behind it. The altered portion of the outer articular surface has the appearance of newly-formed processes of bone filling up a cavity such as exists on the other side. A considerable amount of new bone has been thrown out round the tuberosities below the articular surfaces.

F. P. C. 779.

7. 54. Invasion of Articular Surfaces from Tubercular Synovitis.—Upper end of a right tibia, with very deep erosions.

Large and deep rounded cavities are seen on both sides of the inner and on the front of the outer articular surfaces, the largest being that on the posterior part of the inner tuberosity, where there is a rounded depression large enough to lodge the end of a man's middle finger. There is little or no new periosteal bone formed round the tuberosities. F. P. C. 780.

7. 55. Invasion of Articular Surfaces from Tubercular Synovitis.—Upper end of a right tibia, showing very deep erosions.

There are very large and deep excavations upon the inner condyle, especially towards the back. One extends down into the bone for about three-quarters of an inch. Little or no new bone is formed round the tuberosities. F. P. C. 774.

7. 56. Invasion of Articular Surfaces from Tubercular Synovitis.—Lower half of a right femur, with the patella and upper end of tibia, showing very deep erosions on the tibia.

"The patient in this case was a young man about 18 years of age, and before his admission into the Hospital had suffered much. His

strength was much reduced, and the operation was resorted to as the only means of saving his life. He, however, died some days after the removal of the limb, in which no healing process ever took place. . . . The joint after removal showed incurable disease, viz., deep-seated abscesses filled with scrofulous-looking matter occupying the bone and extending a considerable way down the leg. The articular cartilages covering the condyles of the femur, the patella, and surface of the tibia were almost entirely destroyed. Finally, the bones were deeply affected with caries, the tibia to a great extent."

Besides a general rarefaction of the articular surfaces, the specimen shows deep erosions similar to those in former specimens, on the outer articular surface of the tibia, and on the outer condyle of the femur. (In the recent state such erosions are occupied by tubercular caseous granulations with or without fragments of necrotic bone.) Towards the back of the outer condyle of the femur there is a small patch of smooth bone surrounded by a trench in the bone texture, and beyond that by the general surface of rarefied cancellous bone.

This is a necrosed fragment in process of separation, like that seen in 7. 34. It is to be noted that, as in several previous specimens, there is very little new periosteal formation round the articular surfaces. The whole of the bones are lightened.

G. C. 864.

Presented by Sir GEORGE BALLINGALL, 30th October **1836.**

7. 57. Necrosis of Articular Surfaces from Tubercular Synovitis (?).—Bones forming the right knee-joint of an adult —in spirit, showing extensive changes in the bone.

There is a large loose fragment on the inner condyle of the femur, and on the outer condyle there is a smooth patch, partially entrenched round. On the tibia there is a deep hollow on the inner articular surface, which formerly contained a necrosis, while the greater part of the outer articular surface is smooth and entrenched round like the patch on the femur. A portion of the trochlear surface of the femur is found to be still covered with cartilage. The remainder of the articular

surfaces is covered with fibrous tissue and granulations blanched and altered by the spirit.

It is difficult to say now whether the disease began in the bone or the synovial membrane, probably the latter, from the mischief seeming to have spread equally to both articular surfaces. G. C. 199.

Presented by Professor J. W. Turner.

7. 58. Invasion of Articular Surfaces from Tubercular Synovitis.—Upper end of a left tibia, partially destroyed by the above.

The greater part of the outer tuberosity is wanting, and what remains of it has been deeply eroded. The rest of the articular surface is rarefied and eroded. The tubercle and adjacent portions of the bone have disappeared. There is a slight periosteal crust round what remains of the tuberosities. G. C. 753.

Presented by Professor John Thomson.

7. 59. Invasion of Articular Surfaces from Tubercular Synovitis.—Patella showing commencing rarefaction round the edges of the articular surface. G. C. 1175.

Presented by Professor James Russell.

7. 60. Invasion of Articular Surfaces from Tubercular Synovitis.—Patella showing the greater part of the articular surface rarefied and eroded. G. C. 1175.

Presented by Professor James Russell.

7. 61. Invasion of Articular Surfaces from Tubercular

Synovitis.—Patella, showing, along with considerable rarefaction of the articular surface, some new bone formation on the anterior surface. G. C. 1175.

Presented by Professor JAMES RUSSELL.

7. 62. Invasion of Articular Surfaces from Tubercular Synovitis.—Patella, showing rarefaction of the articular surface, with some development of new bone on the anterior surface and lightening of the original bone texture. G. C. 1175.

Presented by Professor JAMES RUSSELL.

7. 63. Tubercular Synovitis with Abscess.—Plaster cast illustrating the above.

The cast shows a general globular swelling of the joint, with a projection at one spot which must have been due to an abscess. The adjacent parts of the limb have been atrophied. F. P. C. 2889.

b. Changes primarily in bone, or apparently so.

7. 64. Tubercular Arthritis beginning in the Femur.—Sections of the knee-joint of a child—injected and in spirit. One-half has had a slice removed from the front, to display more completely the interior of the epiphyses, and the articular ends of the other half have been wrenched apart.

The interior of the joint has been occupied by pus and curdy matter, and the cartilaginous surfaces have been irregularly eroded. Caseous centres may be seen on the cross section of the lower epiphysis of the femur. The epiphysis of the tibia is apparently intact.

This appears to have been a case where the disease has begun in the bone, for the synovial membrane has not been much affected. G. C. 3192.

Presented by A. G. MILLER, F.R.C.S.E.

7. 65. Tubercular Arthritis beginning in the Tibia.—Lower end of the left femur of a young adult, with the upper ends of the tibia and fibula—macerated, showing changes chiefly in the tibia.

The upper end of the tibia is much lighter than normal. In front its texture is opened out, and its shape is considerably altered owing to rough excavations near the tubercle. The cartilaginous surfaces are comparatively unchanged, although the bone between them in front is rarefied. There has apparently been a tubercular ostitis of the upper end of the tibia, which would probably affect the synovial membrane.

The cancellous tissue of the lower end of the femur has been atrophied in the neighbourhood of the joint.

F. P. C. 775.

7. 66. Tubercular Arthritis beginning in the Head of the Tibia.—Bones of a left knee-joint—macerated, illustrating the above.

A fragment of dead cancellous bone lies loose in a cavity on the front of the inner tuberosity. This cavity communicates above by a round hole with the front of the articular surface, on the outer tuberosity. Some periosteal bone has been formed round the upper end of the tibia, and the articular surfaces are rarefied at the margins. The articular surfaces of the femur are rarefied at various places, but there is little or no new bone formed on the condyles. F. P. C. 782.

Presented by Professor JOHN THOMSON.

7. 67. Tubercular Arthritis beginning in the Head of the Tibia.—Right knee-joint, laid open from the front—in spirit, illustrating the above.

The patient was a man aged 28. The disease had existed for twelve months, and was accompanied with much pain. "Bursa inflamed, thickened, and suppurated, with abscesses in the vicinity of the joint.

Pus and lymph in the cavity of the joint. Semi-lunar cartilages and articular cartilages of the femur and patella eroded, with caries of the bones."

The trochlear surface of the femur is bare, while the surface of the condyles is covered with granulations blanched and shrivelled by the spirit. An aperture in the inner tuberosity of the tibia (indicated by a rod) passes downwards and forwards from the joint. G. C. 1485.

Presented by JOHN CAMPBELL, F.R.C.S.E., **1832.**

7. 68. Tubercular Arthritis beginning in the Epiphysis of the Femur.—Lower epiphysis of a right femur, with upper end of the tibia and fibula, and the patella—macerated, to illustrate the above.

The femoral epiphysis is excavated and eroded chiefly upon the articular surface of the inner condyle, but partly also upon that of the outer condyle. The cartilage has been undermined, as if tubercular foci in the epiphysis had gradually extended themselves into the bone as well as towards the joint. The cartilage upon the outer tuberosity of the tibia, and upon the back of the inner one, is not much affected, but some absorption of the cartilage has occurred on the front of the inner tuberosity, possibly by extension from the femur. The articular surface of the patella has been superficially eroded.

G. C. 1250.

c. Where there are indications, more or less obvious, of a tendency to cure.

7. 69. Tubercular Arthritis subsiding.—Bones of a left knee-joint—macerated, showing great atrophy of the shafts and alteration of the articular surfaces. The epiphyseal end of the shaft of femur is reduced to a light shell. The epiphysis which has been detached is lightened, but to a less extent. The articular surfaces of both bones are rarefied in many places, while the cartilage has remained at others. The tibia is very

light, the interior being rarefied and absorbed. There has been little or no new bone formed on the shaft. The shafts of both femur and tibia are unduly straight, a change seen in very chronic cases with anchylosis in the flexed position.

F. P. C. 776.

7. 70. Invasion of Articular Surfaces, Tubercular Arthritis subsiding.—Lower end of a left femur, illustrating the above.

The lower end of the bone is straighter and lighter than usual, the articular surface is irregular, rarefied, and eroded in many places, and partly absorbed, but the surface has apparently been injured during maceration.

This probably has been a case where anchylosis had taken place in the flexed position, with partial cure of the disease.

F. P. C. 397.

7. 71. Tubercular Arthritis, subsiding.—Lower end of a left femur of a young person—macerated, showing changes, chiefly in the outer condyle.

The bone as a whole is lightened, and the shaft is unduly straight. There is great irregularity from erosion and absorption on the articular surface of the outer condyle, especially towards the back. The trochlear surface is also somewhat irregular. There is some erosion on the back of the inner condyle, and an excavation on the shaft above the back of the outer condyle. No new periosteal bone has been formed. There seems to have been more or less anchylosis in the flexed position, with some tendency to cure. G. C. 3464.

7. 72. Tubercular Arthritis, with great Loss of Bone, subsiding.—Lower end of the right femur of a young person—macerated, with loss of the outer condyle.

The inner condyle is atrophied, and shows only a small patch of cartilaginous surface near the back. The outer condyle and the greater part of the trochlear surface are wanting, and the exposed cancellous bone is irregular. This also has probably been a chronic case with anchylosis.

B. C. II. M. 31.

7. 73. Tubercular Arthritis, with great Loss of Bone, subsiding.—Lower end of a left femur—macerated, illustrating the above.

The front of the trochlear surface and of the outer condyle has disappeared, exposing the interior. The scanty remains of the outer condyle has circular tubercular erosions upon it, and the back of the inner condyle is altered in shape and porous on the surface.

Apparently this has been an old-standing case in which there has been anchylosis of the joint, with much distortion.

G. C. 753.

7. 74. Tubercular Arthritis, tending to cure—Sepsis.—Lower end of a right femur—macerated, illustrating the above.

The trochlear surface and the outer condyle, except a small spur of it at the back, have disappeared, and the articular surface of the inner condyle is scooped out and rarefied. The surface left where the bone has disappeared is rarefied, and shows numerous necrotic fragments in process of separation. There is also a scale of necrotic bone in process of separation, on the outer side of the shaft above the gap.

The great loss of substance on the outer condyle has probably been from tuberculosis, but the necrotic appearances noted have almost certainly been due to septic inflammation.

G. C. 375.

7.75. Tubercular Arthritis, with great Loss of Bone, subsiding.—Bones forming the left knee-joint of an adult—macerated, illustrating the above.

In the femur a portion of the articular surface below each condyle exactly fits the articular surfaces on the tibia, and is comparatively unchanged. In front of this the articular surface on each condyle is deficient, and on the outside it is deeply eroded. Above the articular surface there is a circular aperture about an inch in diameter, leading to a large cavity within the bone, opening posteriorly. A thin crust of new periosteal bone has been formed on the surface for three or four inches above the lower end.

On the outer tuberosity of the tibia the articular surface is unusually concave, and projects above the surrounding bone, but it is not eroded. The articular surface on the inner tuberosity is of a similar shape, but in addition both it and the surrounding bone have been eroded and excavated by tubercular granulations. There is also a roughening by periosteal deposit of the sides of the inner tuberosity. This has been a case where the interior of the lower end of the femur has been greatly affected although there has also been anchylosis of the joint in the straight position. G. C. 374.

7.76. Tubercular Synovitis tending to Anchylosis.—Knee-joint laid open from the front, apparently by forcible flexion—in spirit, illustrating the above.

The articular surfaces of the femur and tibia have been partially anchylosed by developing granulations, while the patella has been drawn right up. The skin over the front of the knee is extensively cicatrised.

This was entered in the MS. Catalogue as a "scrofulous knee-joint." It may, however, have been a case of excision, followed by amputation. G. C. 2451.

7.77. Tubercular (?) Arthritis, partially cured, but with

Necrosis in the Head of the Tibia.—Bones of the right knee-joint of an adult, separated from behind to expose the articular surfaces from the back—in spirit.

The joint was from a patient in the Royal Infirmary, 50 years of age, who recovered after amputation of the limb. He had fallen into the hold of a ship 38 years previously, by which he received a severe injury of the knee—swelling, pain, stiffness, and abscesses about the joint followed. These abated, but left the joint quite stiff and bent at a right angle. Four months before he came to the hospital, abscesses again formed, attended with considerable constitutional disturbance. One of these left an external opening into the joint.

The joint has evidently been flexed, and the patella is anchylosed to the under surface of the outer condyle. The posterior part of the outer condyle is wanting, and the place of the bone in the neighbourhood is taken by fibrous tissue. The articular surfaces on the back of the inner condyle and the inner tuberosity of the tibia are comparatively unchanged, but the articular surface of the outer tuberosity of the tibia is represented partly by a large necrosed fragment, and partly by fibrous tissue. G. C. 2230.

Presented by ALEXANDER WATSON, F.R.C.S.E., **1836.**

7. 78. Tubercular Arthritis breaking out after Subsidence.—Inner section of the bones forming the right knee-joint of a woman—in spirit, showing the fatty and absorbed state of the bone, and altered articular surface.

Emma M., 9 years before operation, fell and hurt her knee, which became swollen, but otherwise did not trouble her for 8 years. Last year it caused her some inconvenience, and having fomented it without effect, she was admitted to Ward 14, and remained there for about seven weeks. Her leg was first put in splints, then blistered, and afterwards extension was applied, the knee, however, getting worse all the time. She then went home, and painted it with iodine, without much improvement. When admitted to Ward 17, the knee was painful, and greatly swollen, especially on the inner side. Three days after admission the leg was amputated, and she made a good recovery.

The tibia has been partly dislocated backwards from the femur. Fibrous tissue has formed above the patella, and at

the back of the joint. On the side of the inner condyle the shreddy wall of a tubercular abscess can be seen laid open.

G. C. 3230.

Presented by A. G. Miller, F.R.C.S.E.

7. 79. Tubercular Arthritis, breaking out after Subsidence.—Outer section of the bones of the previous knee-joint—macerated, to show the changes on the articular surface and the absorption of bone.

The cartilage was entirely removed from the articular surfaces, which are altered in shape and irregular on the surface. The adjacent parts of the tibia and femur show slight erosions, partly smoothed over. The trochlear surface of the femur and articular surface of the patella show rarefaction, also smoothed over. Irregular spicules of periosteal bone roughen the tibia and femur near the articular surfaces.

G. C. 3231.

7. 80. Tubercular Arthritis with Developing Anchylosis.—Bones forming a right knee-joint—partially macerated and in spirit. The bone has apparently been accidentally broken in the process of preparation, and the broken pieces are held together by threads.

The bones have been fixed in the flexed position. The interior of both femur and tibia has been greatly absorbed, and the bone has been soft and fatty. The patella is united, apparently by bone, to the front of the articular surface of the outer condyle, and the inner condyle and inner tuberosity of the tibia are united partly by bone and partly by fibrous tissue.

The inner condyle and inner tuberosity of the tibia are not in contact.

W. C. H. 41.

7. 81. Anchylosis after Tubercular Arthritis.—Inner half of the left knee of a young person—in spirit, illustrating the above.

The specimen shows numerous scars on the skin, the result of previous abscesses, also partial dislocation of the tibia backwards, as well as development of fat in the bones and of fibrous tissue round the joint. The anchylosis is fibrous and osseous between the femur and tibia, and fibrous between the patella and the femur. G. C. 3144.

Presented by MACDONALD BROWN, F.R.C.S.E.

7. 82. Anchylosis after Tubercular Arthritis.—Outer half of the previous knee-joint—macerated, illustrating the above.

The front of the outer articular surface of the tibia articulates with the back of the outer condyle. The upper part of the shaft of the tibia has had a slight concavity looking forwards. The femur and tibia are seen to be anchylosed, partly by bone, but apparently mainly by fibrous tissue. The cancellous texture of the femur, tibia, and fibula is opened out into large spaces, and the trabeculæ are delicate and thin. G. C. 3145.

Presented by MACDONALD BROWN, F.R.C.S.E.

7. 83. Anchylosis after Tubercular Arthritis.—Lower end of a left femur and patella—macerated, illustrating the above.

The inferior aspect of the condylar surfaces is flattened, and the articular surface is rarefied, remains of cartilage being only seen at the back. The patella has been partially anchylosed to the trochlear surface of the femur. No new bone has been thrown out round the femur, and its texture is lightened and greasy. G. C. 373.

7. 84. Anchylosis after Tubercular Arthritis.—Lower end of a left femur, upper half of tibia and patella — macerated, showing partial anchylosis and unusual distortion.

The knee-joint has been fixed at a right angle. The patella is anchylosed to the front of the outer condyle, the back of which is sunk into and partially anchylosed to the outer tuberosity of the tibia. The inner condyle is separated from the inner tuberosity by about half an inch. No new periosteal bone has been formed. The substance of the bones is very greasy.

Sir Charles Bell states that "this kind of distortion is owing to the patient's twisting his leg round the crutch."

B. C. II. M. 28.

7. 85. Anchylosis after Tubercular Arthritis.—Bones of a left knee-joint—macerated, and showing anchylosis in the flexed position.

The patella, which is anchylosed to the under surface of the outer condyle, has had an imperfect false joint between its lower edge and the front of the inner tuberosity of the tibia. The back of the inner condyle of the femur is adherent to the inner tuberosity of the tibia, the line of junction being irregular, and having been formed chiefly of fibrous tissue, now for the most part macerated away. The outer condyle of the femur has not been in contact with the corresponding tuberosity of the tibia, which, however, has been greatly absorbed.

The tibia has been pulled backwards and rotated outwards upon its inner tuberosity, so that the outer tuberosity is proportionately more dislocated than the inner. The bones are light and greasy. Active disease seems to have entirely ceased.

G. C. 1003.

7. 86. Anchylosis after Tubercular Arthritis.—Bones of a left knee-joint—macerated, showing anchylosis in the flexed position and distortion.

The patella is anchylosed chiefly by fibrous tissue to

the under part of the trochlear surface. The back of each condyle has been anchylosed to the corresponding tuberosity of the tibia; but the tibia is partially dislocated backwards and rotated outwards. In this specimen, however, the rotation has chiefly occurred by the bending outwards of the shaft of the femur, just above the condyles, possibly from twisting round a crutch. The bones are light and greasy. F. P. C. 817.

Presented by Professor JAMES RUSSELL.

7. 87. Anchylosis after Tubercular Arthritis.—Bones of a left knee-joint—macerated, illustrating the above.

The joint has been in the semi-flexed position. The patella is united by bone to the lower part of the outer condyle. The inner condyle is also firmly united by bone to the inner tuberosity of the tibia, while the back of the outer condyle has been anchylosed by fibrous tissue to the front of the outer tuberosity of the tibia. The tibia has been dislocated backwards and rotated outwards upon the articulation between the inner tuberosity and the inner condyle. The bones are better developed and less greasy than in the three foregoing specimens.

W. C. H. 47.

7. 88. Anchylosis after Tubercular Arthritis.—Bones of a left knee-joint—macerated, illustrating the above.

The joint has been only slightly flexed. The patella is united by bone to the outer condyle. The inner condyle is united by bone to the inner tuberosity.

In this, as in the previous specimen, the tibia is dislocated backwards and rotated outwards round the inner part of the articulation. There is a tendency of the femur and tibia to be curved backwards above and below the joint, thus partially undoing the flexion there. The bones are light and greasy.

F. P. C. 816.

Presented by Professor JAMES RUSSELL.

7. 89. Anchylosis after Tubercular Arthritis.—Bones of a left knee-joint—macerated, showing bony anchylosis in the straight position.

There is a considerable gap between the condyles of the femur, chiefly at the expense of the outer, but the walls of the gap seem to have healed. The osseous anchylosis between the condyles of the femur and tuberosities of the tibia is formed by well-developed cancellous tissue. The texture of the bones is firm and free from grease. W. C. H. 47.

d. Results of operations for tubercular disease of the knee.

7. 90. Return of Tubercular Disease after Excision of the Knee.—Section of an injected knee of a lad aged 16 years—in spirit, illustrating the above.

The limb was amputated two months after excision on account of the continuation of discharge from several sinuses.

The specimen shows, however, that the soft parts rather than the bone have been involved by the return of tuberculosis. The ends of the bones are fatty, but not tubercular. Two caseous centres may be seen behind the lower end of the femur. A line of fibrous tissue indicates the junction of the two bones. G. C. 3071.

Presented by A. G. Miller, F.R.C.S.E.

7. 91. Return of Tubercular Disease after Excision of the Knee.—Section of the knee-joint of a child after excision—in spirit, showing the position of a tubercular sinus.

The child was aged 10 years, and the joint had been excised two years previously in another town for tubercular disease. The limb was amputated by Dr P. H. MacLaren, partly for the persistence of the discharge from a sinus, partly for the fibrous union, and partly for the deficient growth of the limb.

There is a wide fibrous union between the bones. The epiphysis has been removed at the excision from both femur and tibia, thus accounting for the want of growth. A blue rod

indicates the direction of the sinus which has evidently been due to some tubercular synovial membrane left above the patella at the time of the excision. G. C. 2790.

Presented by P. H. MacLaren, F.R.C.S.E.

7. 92. Return of Disease after Excision of the Knee.—Section of the left knee-joint of a young person—in spirit, illustrating the above.

The knee-joint was excised for tubercular disease, but owing to the persistence of discharging sinuses, amputation was performed.

The destruction of part of the adjacent portions of the femur and tibia by tubercular granulations is well shown. The line of union is fibrous, and has been progressing well.

G. C. 3299.

Presented by A. G. Miller, F.R.C.S.E.

7. 93. Return of Disease after Excision of the Knee.—Outer half of the previous specimen—macerated.

The preparation shows the eroded state of the adjacent parts of the tibia and femur, the disease having in each case burrowed along the track of the steel pins which were inserted, and retained for six weeks, in order to steady the bones.

G. C. 3300.

Presented by A. G. Miller, F.R.C.S.E.

7. 94. Non-union after Excision of the Knee-joint.—Section of a knee-joint after excision—in spirit, illustrating the above.

There is a wide fibrous union of the two bones, and a tubercular focus in the upper end of the tibia. G. C. 2452.

7. 95. Tubercular Disease of the Knee-joint—Erasion.—Suppurative Osteomyelitis of the Femur.—Section of the lower end of the femur and knee-joint of a child—in spirit, illustrating the above.

About two years before amputation, the child had suffered from tubercular knee-joint disease, for which erasion had been performed. The femur had afterwards been the seat of acute osteomyelitis, ending in necrosis, for which amputation became necessary.

The section shows a large sequestrum of the shaft of the femur, surrounded by a very thick shell of new bone. The epiphysis of the femur is seen beneath the patella. It is separated from the shaft by a layer of fibrous tissue behind, and by a large gap in front, which communicated with the sequestrum. The original cavity of the knee-joint is now occupied by fibrous tissue. G. C. 3458.

Presented by JOHN DUNCAN, F.R.C.S.E.

Sacro-iliac joint.

7. 96. Tubercular and Septic Disease of the Sacro-iliac Joint.—Pelvis of an adult, macerated—showing extensive destruction of the right sacro-iliac joint.

The case is said to have been one of psoas abscess.

The sacrum and ilium in the neighbourhood of the joint are much eroded, and very irregular. The acetabula are very shallow, and all round the pelvis, but especially on the right ilium, there are numerous irregular outgrowths of bone.

W. C. H. 61.

Hip-joint.

a. Changes primarily or chiefly in the synovial membrane.

7. 97. Tubercular Synovitis.—A left hip-joint laid open—in spirit, illustrating the above.

On the head of the femur shreddy granulations replace the cartilage over the central portion, and at the margins. In

the acetabulum a few flakes of cartilage remain, but the most of the articular surface shows bare bone. The synovial membrane round the acetabulum is thickened, and is shreddy on the surface. G. C. 172.

7. 98. Tubercular (?) Synovitis, involving the Bone.—Part of a left innominate bone and thigh bone—macerated, illustrating the above.

From a patient who died of hip-joint disease.

"The capsular ligament was much relaxed, the ligamentum teres was entirely destroyed, the cartilages much eroded, the acetabulum nearly filled with coagulable lymph, and the head of the femur dislodged."

The articular surface of the acetabulum is rarefied and rough, and the normal smooth layers which lie below the cartilage remains only in some places. On the upper and lateral parts of the head of the femur the bone is similarly rarefied, and also partially absorbed at the front. Above and behind the attachment of the ligamentum teres there is some eburnation of the surface, such as is seen in arthritis deformans. Round the acetabulum there has been a considerable deposit of new bone. A small deposit of new periosteal bone is seen on the under side of the neck of the femur.

The eburnation on the head of the femur points to arthritis deformans, while the new growth round the acetabulum resembles that due to septic irritation; the rarefaction and "flakes of coagulable lymph" may have been tubercular. Possibly, therefore, arthritis deformans has been followed by tuberculosis, and this has led to an abscess, which, after bursting, has become septic. B. C. II. M. 7.

7. 99. Tubercular Synovitis, involving the Acetabulum.—Right of innominatum—macerated, illustrating the above.

The whole bone is light and soft, and the channels for blood-vessels are enlarged. The articular surface of the acetabulum is rarefied and partially absorbed, and the interior of the bone is filled with adipocere. G. C. 3642.

7. 100. Tubercular Synovitis, involving the Head of the Femur.—Vertical transverse section of the head and neck of a left femur—macerated.

The patient, a young man, had suffered from symptoms of hip-joint disease for some time, and the head and the great trochanter were excised.

The articular surface is rarefied and rough all over. In addition, the upper part of the head is greatly absorbed, probably from the disease there being aided by pressure.

G. C. 3462.

Presented by JOHN DUNCAN, F.R.C.S.E.

b. Changes primarily or chiefly in the bone.

7. 101. Tubercular Arthritis, with Destruction of the Head of the Femur.—Upper end of the right femur of a child—in spirit, illustrating the above.

The patient was a girl, aged four, who died in the Royal Hospital for Sick Children, from disease of the hip-joint.

The great and small trochanters were completely separated from the shaft during life. The bone was therefore presumed to be dislocated, from the amount of displacement which was observed on moving the limb. The head has disappeared.

G. C. 2663

Presented by R. BLAIR CUNYNGHAME, F.R.C.S.E.

7. 102. Tubercular Ostitis of the Neck of the Femur.—Upper end of the right femur of a child—in spirit, illustrating the above.

There is a large cavity in the neck and great trochanter, and it extends also into the head. The walls of the cavity are partly formed by fibrous tissue, but at the lower, and upper and inner ends there are remains of a caseous extension. At the latter place the disease has penetrated into the upper part of the head. The cartilaginous surface is apparently unchanged.

This has probably been a case where the bone disease has led chiefly to external abscesses, with secondary and late implication of the joint. G. C. 2014.

7. 103. Tubercular Arthritis, chiefly involving the Acetabulum.—Bones forming the left hip-joint of a growing person —macerated, illustrating the above.

The cavity of the acetabulum is enlarged, and in several places is perforated. Two portions of bone have been necrotic and in process of separation — one at the junction of the iliac and pubic, and the other, a larger piece, at the junction of the iliac and ischial portions of the acetabulum. The rest of the acetabular surface is rarefied and eroded where it is not perforated. The articular surface of the head of the femur is also rarefied and rough, and the texture of the neck is lightened. The angle between the neck and the shaft is increased, a change often seen in femora of young, bed-ridden patients. G. C. 1150.

7. 104. Tubercular Arthritis, chiefly involving Acetabulum.—Left innominate bone and upper end of the femur —macerated, illustrating the above.

The upper part of the acetabulum is very irregular, and at one spot is perforated by an aperture a quarter of an inch in diameter. A large piece of bone at the top is necrotic, and has been in process of separation, and similar pieces have no doubt dropped out from the gaps in the neighbourhood. The

upper end of the femur is rough and opened out, and the bone is absorbed, especially upon its anterior and upper aspects.

B. C. II. M. 3.

7. 105. Tubercular Arthritis involving the Acetabulum.—Plaster cast, coated with wax, of the pelvis and thighs of the patient from whom the previous specimen was obtained.

There is marked adduction of the diseased hip-joint, with tilting of that side of the pelvis, and swelling round the trochanter. The ulcers on the outer side of the thigh have a characteristically tubercular appearance, and have, no doubt, communicated with the joint. B. C. II. M. 2.

7. 106. Tubercular Arthritis destroying the Acetabulum.—Left ilium and upper end of femur — macerated, illustrating the above.

"The neck of the thigh bone was in the pelvis. The patient was exhausted by irritation and suppuration."

The bottom of the acetabulum is wanting, and a circular-aperture of one and a half inches in diameter thus leads into the pelvis. The remains of the walls of the acetabulum are rarefied and rough. There is a considerable development of new bone round the outer surface of the acetabulum. The head of the femur is wasted down to a pointed extremity. New periosteal bone has been formed on the under and front aspects of the neck.

This has evidently been a case where septic abscess has complicated the original disease. B. C. II. M. 5.

7. 107. Tubercular Arthritis destroying the Acetabulum.—Right innominate bone of a young person—macerated, illustrating the above.

The bottom of the acetabulum is wanting, and an irregular cavity one and a quarter inches by two inches in diameter thus

leads into the pelvis. The remains of the walls of the acetabulum are very irregular, but have an appearance of healing. On the inner aspect, below the acetabulum, the surface of the ischium is eroded, and shows some necrotic pieces in the interior. There is a considerable but somewhat smooth thickening of the outer surface of the ilium. The disease in this case has apparently tended to subside. B. C. II. M. 6.

7. 108. Tubercular Arthritis involving the Head of the Femur.—Upper end of the right femur of a child—macerated, illustrating the above.

The head is wanting and the epiphysial end of the neck is irregular. There is also a deficiency at the top of the great trochanter. F. P. C. 748.

7. 109. Anchylosis of the Hip-joint from Disease(?).—Section of the upper half of the right femur and acetabulum of an old woman—macerated, illustrating the above.

The greater part of the neck has disappeared, and it is impossible now to say where the head ended and the acetabulum began. The cancellous tissue is well formed, and extends down to the level of the position of the small trochanter. The walls of the medullary cavity and the shaft of the bone are condensed and thick.

The fusion is so complete in this case, that one is tempted to believe that it has been congenital. G. C. 3480.

Presented by ALEXIS THOMSON, F.R.C.S.E.

ANKLE-JOINT.

a. Changes primarily or chiefly in the synovial membrane.

7. 110. Tubercular Synovitis involving the Astragalus.

—Section of the left foot of a woman—in spirit, illustrating the above.

The patient, aged 43, was delicate and nervous, and had previously suffered from suppurating cervical glands. A tubercular abscess had formed in the lower end of the tibia (No. 6. 212), which was opened and scraped. Fourteen days afterwards the pain settled in the ankle, and amputation became necessary.

The specimen shows tubercular affection of the synovial membrane, extending over the upper surface of the astragalus and attacking the cartilage.

Although the disease in this case was primarily in the bone, this specimen has been placed among the synovial membrane affections, because it shows the disease there only.

G. C. 2836.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

7. 111. Tubercular Synovitis involving Cartilage and Bone.—Bones forming a right ankle-joint "from a negro boy" —injected with vermilion, and in spirit.

The joint is exposed from the front by a section of the tibia, which is turned down.

The articular surfaces of the ankle-joint, and especially those of the astragalus, are covered with a flocculent vascular membrane, to which the sound cartilage on the under surface of the astragalus forms a striking contrast. There is a cavity in the inner side of the tibia above the malleolus, which is lined by vascular granulations.

A portion of the skin below this has been left to show sinuses which must have opened into the joint, and by which no doubt, sepsis had entered to complicate the tuberculosis.

B. C. II. M. 35.

7. 112. Tubercular Synovitis, involving the Articular Surface of the Tibia.—Lower end of a left tibia—macerated, illustrating the above.

The articular surface for the astragalus is rarefied and eroded. B. C. II. M. 37.

7. 113. Tubercular Synovitis, involving the Lower Ends of the Tibia and Fibula.—Lower ends of a left tibia and fibula—macerated, illustrating the above.

The lower end of the fibula is enlarged by new periosteal bone, and the tip of the malleolus is rough. The lower end of the tibia is also enlarged, especially at the back and inner side. The articular surface is rarefied and eroded.

This probably has been a tubercular case turned septic. F. P. C. 801.

7. 114. Tubercular Synovitis, involving the Lower Ends of the Tibia and Fibula.—Lower ends of a right tibia and fibula—macerated, illustrating the above.

The patient had a scrofulous affection of the ankle-joint.

The articular surface of the tibia in several places is bared of its scale of smooth bone, exposing the cancellous tissue beneath. Above the articular surface, in front and on the outer side, there are rounded erosions as if from tubercular granulation tissue. A crust of new bone extends up the back and outer sides. The lower end of the fibula is much enlarged by a new periosteal formation, the inner aspect of which is considerably eroded. B. C. II. M. 41.

7. 115. Tubercular Synovitis, involving the Tibia and Astragalus.—Lower end of a left tibia and astragalus—macerated, illustrating the above.

The articular surface of the tibia is rarefied and irregular, and a slight crust of new bone has been thrown out on the back and inner sides of the lower end of the shaft. The

astragalus has its upper and lateral articular surfaces rarefied and partially absorbed. F. P. C. 802.

Presented by Professor JOHN THOMSON.

b. Changes primarily or chiefly in the bone.

7. 116. Tubercular Arthritis, involving the Tibia and Fibula.—Half of the lower end of a right tibia and corresponding part of fibula—macerated, illustrating the above.

The changes were said to be due to "scrofulous caries."

Both bones are enlarged, and their articular surfaces are irregular. The interior of the tibia is partly occupied by adipocere. (A left astragalus was formerly mounted along with the above bones, but as it shows nothing of importance, it has been discarded.) F. P. C. 803.

Presented by Professor JAMES RUSSELL.

7. 117. Tubercular Arthritis, involving the Bones at the Ankle-Joint and the Os Calcis.—Lower ends of the tibia and fibula of a boy, with remains of the os calcis and astragalus—macerated and in spirit.

Amputation was performed.

The bones are lightened and considerably altered in shape, but the adipocere formed during maceration masks their condition. G. C. 2169.

Presented by BENJAMIN BELL, Junr., F.R.C.S.E., 1840.

7. 118. Tubercular Arthritis, involving the Tibia.—Lower end of a right tibia—macerated, illustrating the above.

Except at one small place on the outer side, the articular plate of the bone is removed, leaving the surface below rough and irregular. At the back, above the articular surface, but extending downwards into it, there is a large cavity, with

the circular eroded appearance produced by tubercular granulations. New bone has been thrown out round the lower end, especially on the outer and posterior surfaces. G. C. 1154.

Presented by Professor JAMES RUSSELL.

7. 119. Old Standing Tubercular Arthritis, involving the Tibia, Astragalus, and Os Calcis.—Lower end of a left tibia, anchylosed to the remains of the astragalus, and that again to the os calcis—macerated, illustrating the above.

The lower end of the tibia is enlarged at the sides and hollowed out in front. The astragalus is anchylosed by bone to the lower end of the tibia, and its original shape is scarcely recognisable. The os calcis, in like manner, is anchylosed to the astragalus. The texture of these two tarsal bones, as well as of the lower end of the tibia, is expanded and light. This has evidently been a case of long-standing disease, partially cured, but probably still slowly progressing in the lower end of the tibia. B. C. II. M. 40.

7. 120. Tuberculosis of Ankle.—Plaster cast of the front of a right ankle and foot. There has been great swelling in the region of the ankle, especially on the inner side, where there is also a large tubercular-looking ulcer of the skin. There seems to have been some outward displacement of the foot.

F. P. C. 2883.

THE JOINTS OF THE FOOT.

a. Changes primarily or chiefly in the synovial membrane.

7. 121. Tubercular Disease of the Foot.—Sections of the left foot of a girl—injected, and in spirit, illustrating the above.

There are sinuses upon the inner aspect, the sole, and the dorsum. The bones are not much affected. The abscesses have probably begun in some of the synovial membranes.

G. C. 2714.

Presented by F. M. Caird, F.R.C.S.E.

b. Changes primarily or chiefly in the bone.

7. 122. Tubercular Disease of the Tarsus.—Section of the foot of a young woman—injected with carmine, and in spirit, illustrating the above.

The joint between the scaphoid and the middle cuneiform bone has been destroyed, and a sinus on the dorsum leads down it. There are caseating centres in each of these two bones.

G. C. 3181.

Presented by Charles W. Cathcart, F.R.C.S.E.

7. 123. Tubercular Disease of the Tarsus and Metatarsus.—Outer section of the left foot of a Hindoo woman—in spirit, illustrating the above.

A swollen area studded with small ulcers occupies the greater part of the dorsum. The cut surface shows numerous caseating centres both in the soft parts and in the bones.

This specimen was considered at first to be one of mycetoma, but a closer examination showed it to be tubercular

G. C. 2553.

Presented by Joseph Bell, F.R.C.S.E.

7. 124. Tubercular Disease of the Foot and Ankle.—Right tarsal bones and lower part of tibia and fibula—macerated, illustrating the above.

From a patient, Margaret Jardine. The disease had existed for many years before the leg was amputated. "The patient afterwards became demented."

The adjacent surfaces of the astragalus and tibia are remarkable for showing a hard and eburnated portion of the articular surface, while the rest is rarefied and eroded. The surfaces of the astragalo-scaphoid joint are very rough and irregular, as are also those of the joints between the astragalus and os calcis. These three bones are also lightened and eroded interiorly. The joint between the os calcis and the cuboid has been affected, but to a less extent, while the cuneiform bones seem intact. The articular surface of the fibula is eroded, and shows a few pieces of smooth bone. A slight crust of new periosteal bone has been formed at the lower ends of the tibia and fibula, as if from septic complication. G. C. 906.

Referred to in Sir George Ballingall's Clinical Lectures, No. 1, page 7.

Presented by Sir GEORGE BALLINGALL.

7. 125. Tubercular Disease of Tarsus and Metatarsus. —Several of the left tarsal and metatarsal bones of a young person—macerated, illustrating the above.

There are tubercular changes in several of the bones. The shaft of two of the metatarsal bones are enlarged, and their interiors are hollowed out, and several other bones are rarefied and partially absorbed. G. C. 940.

7. 126. Disease of Tarsus, possibly Tubercular, but chiefly Septic.— Lower end of the right tibia and fibula, astragalus, os calcis, first, fourth, and fifth metatarsal bones, and some phalanges of a child—macerated, illustrating the above.

John Carlan, aged 3, was admitted to the Royal Infirmary, Edinburgh, on 3rd July 1827, suffering from extensive ulceration over the malleoli of the right leg. The tibia and fibula were bare, and the ankle-joint exposed. Four weeks previously he had received some injury which, after three weeks, had ended in an abscess. Owing to increased discharge, with diarrhœa, the leg was amputated, but the patient died within a week. The astragalus was found loose, "embedded in pus," and the lower end of the fibula was covered with granulations.

The bones are light, and their texture partially absorbed, the head of the astragalus and the base of one of the metatarsal bones being chiefly affected. A crust of new bone has been thrown out on the tibia and fibula. G. C. 936.

Referred to in Sir George Ballingall's Clin. Lect., Nov. 2, p. 11.

Presented by Sir George Ballingall.

7. 127. Tubercular Disease in a Regenerated Os Calcis.—Section of the left foot of a boy, aged 14—in spirit, illustrating the above.

Dr Joseph Bell excised the os calcis for tubercular disease. The bone was completely regenerated, but two years afterwards the patient presented himself again with a return of the disease in the upper portion of the new os calcis. The foot was therefore amputated.

A considerable part of the back of the os calcis has been tunnelled by tubercular granulations, now blanched by the spirit. G. C. 2665.

Presented by Joseph Bell, F.R.C.S.E.

7. 128. Regeneration of the Os Calcis after Excision.—Plaster cast of the outer half of the right foot of a young man—a different case from the last, illustrating the above.

Several years before the cast was taken, Dr Joseph Bell excised the os calcis for tubercular disease, leaving the periosteum. The bone was re-formed so as to maintain the shape of the heel, and the depressed scar was the only abnormal appearance to be detected.

G. C. 3532.

Presented by Charles W. Cathcart, F.R.C.S.E.

7. 129. Disease of Os Calcis, possibly Tubercular.—Right os calcis—macerated.

The posterior articular surface for the astragalus is much rarefied. New periosteal bone has been formed on the sides of the bone near the affected articulation. B. C. II. M. 43.

7. 130. Tubercular (?) Disease of the First Metatarso-phalangeal Joint.—Head of metatarsal bone and phalanges of a great toe—macerated, illustrating the above.

"From a man about 60 years of age. The disease originated about twenty years ago in frost-bite. The toe was dislocated at the proximal phalanx, and turned inwards at a right angle. In amputating it the metatarsal bone was cut across."

The joint between the metatarsal bone and first phalanx is partly absorbed and roughened by erosions. G. C. 1486.

Presented by JOHN CAMPBELL, 17th April 1833.

SHOULDER-JOINT.

Primarily and chiefly in the Synovial Membrane.

7. 131. Tubercular Synovitis, involving the Bone.—Bones forming a left shoulder joint—macerated, illustrating the above.

"The effect of scrofulous inflammation."

The articular surface of the humerus is bared of its smooth plate of bone, and is rarefied and rough. The glenoid cavity is partly affected in the same way, and the greater part of the acromion process is deficient; the remaining bone being greatly opened out and in process of absorption. Some new bone has been thrown out round the glenoid cavity and upon the spine.

B. C. II. M. 48.

ELBOW-JOINT.

a. Changes primarily or chiefly in the Synovial Membrane.

7. 132. Tubercular Synovitis involving the Articular Surfaces.—Bones forming a right elbow-joint, soft parts removed—in spirit, illustrating the above.

The arm was amputated, and the patient did well.

The articular surface of the humerus is bared of cartilage at some places, and at others the cartilage is undermined, and hangs in loose flakes and tags. Similar changes are seen on the head of the radius, and to a less extent upon the ulna.

W. C. H. 38.

7. 133. Tubercular Synovitis involving the Articular Surface.—Upper end of a right ulna—macerated, illustrating the above.

The cartilaginous surfaces of the greater and lesser sigmoid cavities have been for the most part rarefied, leaving only a narrow margin of cartilage round the top of the greater sigmoid cavity. F. P. C. 369.

7. 134. Tubercular Synovitis, involving the Articular Surface.—Upper end of a left ulna—macerated, illustrating the above.

There is rarefaction of the articular surfaces, especially of the lesser sigmoid cavity. New bone has been thrown out below the joint. G. C. 1149.

Presented by Professor JAMES RUSSELL.

7. 135. Tubercular Synovitis involving the Articular Surface.—Portions of a left elbow-joint removed by excision —macerated, illustrating the above.

When fresh, the articular surfaces were in many parts covered with pulpy gelatinous material. At other places, soft gelatinous material (granulation tissue) had spread between the bone and the cartilage, and was absorbing it from below. The cartilage, however, was not loose, as it still adhered to the gelatinous material. On the articular surface of the humerus, two hard white nodules of bone stood out from the surrounding granulations. At the outer side there was a cavity entirely filled with gray gelatinous material, becoming caseous at various points. The articular surface of the ulna presented a similar appearance.

The articular surfaces are rarefied, and show the deep holes which were filled with the gelatinous granulation material.

On the front of the humerus, the two small portions of necrotic bone are seen, partially separated by the surrounding granulations. G. C. 3237.

Presented by J. M. Cotterill, F.R.C.S.E.

7. 136. Tubercular Synovitis, involving the Bone.—Lower end of a left humerus—macerated, illustrating the above.

The articular surface is rarefied and much wasted, and shows an excavation on the outer side. Some new bone has been thrown out on the condyles. B. C. II. M. 54.

7. 137. Tubercular Synovitis, involving chiefly the Radius and Ulna.—Adjacent halves of a left humerus, radius, and ulna—macerated, illustrating the above.

The disease was of many years standing, and the limb was amputated by Professor Ballingall by the double flap method. The patient was dismissed within a fortnight, with the wound healed by first intention.

The articular surface of the humerus is rarefied and eroded at places. The articular surface of the ulna is rarefied and irregular, being excavated in many places. The changes, however, are most advanced in the radius. The interior of the head of that bone is for the most part absorbed. The upper articular surface has necrosed, and, although still in position, is separate from the surrounding bone.

These changes seem to be advanced stages of those seen in previous specimens. G. C. 905.

b. Changes primarily or chiefly in the Bone.

7. 138. Senile Tuberculosis affecting the Bones of the Elbow.—Section of the right elbow of an old man—injected, and in spirit, illustrating the above.

The patient, although aged 81, was wiry and strong. His family

history was good, and previous health excellent. About three years before his admission to the Royal Infirmary, Edinburgh, he had sprained his right arm, and it had never been quite the same again. Some months before his admission, a swelling had appeared just below the front of the right elbow, and had gradually increased, till it burst and discharged. On admission, there was still swelling there, and an open sore with tough white sloughs lying in its centre. After poultices and blisters, the sloughs separated and the sore closed, but about the same time a chronic swelling appeared at the back of the elbow, and after being opened, turned septic. As the patient's health began to suffer, amputation was performed, and he made a good recovery.

The section of the arm shows a mass of cicatricial tissue in the site of the former swelling on the front of the arm. It is not connected with the joint. The cartilage of the elbow joint is almost entirely replaced by granulations. A caseous cavity, which opened into the elbow-joint, is seen on the ulna, and non-vascular deposits between this cavity and the joint.

G. C. 2810.

Presented by P. H. MacLaren, F.R.C.S.E.

7. 139. **Tubercular Arthritis, with Destruction of the Articular Surface of the Humerus.** — Bones of a left elbow—macerated, illustrating the above.

The central portion of the lower articular surface of the humerus is wanting, and the bone round it is greatly opened out, as if in process of absorption. A portion of the smooth articular surface of the capitellum remains, but on what is left of the trochlear surface the bone is rarefied. Corresponding changes are present on the articular surfaces of the ulna and radius. Some new periosteal bone has been formed on all the bones near their articular surfaces.

There has evidently been a septic complication in the later stages of the disease, but that the primary mischief was in the bone is only a conjecture based upon the comparatively localised destruction of the bone. G. C. 1148.

7. 140. **Advanced Tubercular Disease of the Elbow.**—

Plaster of Paris cast of a left elbow-joint and forearm — after amputation, illustrating the above.

The joint is much swollen, and a large unhealthy ulcer covers its outer and back part. F. P. C. 2882.

7. 141. Tubercular Disease of the Elbow, affecting chiefly the Humerus and Ulna.—Lower end of a left humerus—with ulna and radius—macerated, illustrating the above.

"From a boy, aged 8, who had received a slight injury on the elbow. He got into the hands of an ignorant person, calling himself a bone-setter. The violence which this person at repeated intervals used, in order to reduce a supposed dislocation of the joint, no doubt gave rise to the scrofulous caries in the bone, and which is finely displayed in this preparation."

The upper end of the ulna is much enlarged by new growth on the surface, and a piece of bone, forming apparently the original articular surface, has necrosed, and has been in process of separation, for the adjoining bone is separated from it by a groove. The upper end of the radius is slightly enlarged by new bone growth on the surface, and the epiphysis has disappeared. The humerus is likewise enlarged above the articular end by new periosteal bone formation. The epiphysis on the radial side alone remains. G. C. 735.

Presented by JAMES PITCAIRN, F.R.C.S.E., **1825.**

7. 142. Tubercular Arthritis, with Extensive Changes in the Adjacent Bones.—Bones of the left fore-arm and lower end of humerus of a child — macerated, showing great changes in the humerus and ulna, but not in the radius.

The ulna is enormously thickened in its upper half. The enlargement is tunnelled by rounded channels, which open at the articular surface, at the back, and at the outer side. The articular surface is so altered as to be scarcely recognisable. The lower end of the humerus presents similar changes, but

less advanced. The bone is enlarged and roughened on its surface, especially in front. The articular surface formed by the lower epiphyses has for the most part disappeared. The upper end of the radius is not much altered. G. C. 3465.

c. Process of cure after tubercular disease of the elbow.

7. 143. Tubercular Arthritis, subsiding after involvement of Bone.—Bones of the right elbow-joint of a child—macerated, to illustrate the above.

The upper end of the ulna is greatly enlarged, while that of the radius is less so. The lower portion of the shaft of both bones is greatly atrophied. The lower end of the humerus is enlarged, but the most noteworthy change is the absorption on the inner side, so that the ulna is displaced upwards. The two necrotic fragments at the lower end of the humerus are apparently the remains of its lower epiphyses. The shaft of the humerus is atrophied, but to a less extent than those of the radius and ulna. B. C. II. M. 50.

7. 144. Bony Anchylosis of the Elbow after Disease.—Lower end of a right humerus and adjacent parts of the radius and ulna—macerated, illustrating the above.

On the front of the humerus, above the ulna, there is a small cavity. This, as well as the indications of former alterations of the articular surfaces, point to a healed tubercular disease of the elbow. W. C. H. 45.

d. Result of operation for tubercular disease of the elbow.

7. 145. Excision of the Elbow for Tubercular Disease.—Parts remaining after excision of a right elbow—injected, and in spirit, illustrating the above.

The arm was amputated three weeks after excision owing to the persistence of a profuse discharge.

The ends of the bones are becoming smoothed off, and there has been some adhesion between the triceps and the upper end of the ulna. G. C. 3084.

Presented by P. H. MacLaren, F.R.C.S.E.

WRIST-JOINT.

a. Changes primarily or chiefly in the synovial membrane.

7. 146. Tubercular Disease of the Wrist.—Left hand—injected, and in spirit, with the wrist exposed from the back, to illustrate the above.

"The bones of the wrist are here diseased owing to a puncture at the wrist-joint; the scrofulous action, however, was general in the whole hand, however especially produced."

The synovial membrane has been dissected away, and the changes in the articular surfaces are as yet scarcely perceptible.

B. C. II. M. 56.

7. 147. Tubercular Disease of the Wrist.—Cast in *papier maché* of the back of the right hand of a young woman, showing swelling of the wrist.

The wrist was afterwards excised for tubercular disease in the synovial membrane and bone.

There is the usual swelling most marked over the carpus, and gradually fading off above and below. G. C. 3476.

Presented by Alexander Miles, F.R.C.S.E.

b. Changes primarily or chiefly in the bone.

7. 148. Tubercular and Septic Disease of the Wrist, involving the Radius.—Right radius of an adult—macerated, and showing changes in its lower end.

The lower end is somewhat enlarged. The posterior margin and part of the adjacent articular surface, however, is wanting. Probably a tubercular case complicated by sepsis.

B. C. II. M. 60.

7. 149. Tubercular and Septic Disease of the Wrist, involving the Lower End of the Radius.—Lower end of a left radius—macerated, showing extensive changes at and near the articular surface.

For about two inches above the articular surface the bone is greatly enlarged by numerous irregular periosteal outgrowths, the articular surface being rarefied and superficially eroded.

This has all the appearance of a bone, upon which septic irritation has acted for some time, although probably initiated by tubercular disease. The differences between this and the last specimen may be due to a preponderance of septic influences upon this one. B. C. II. M. 28.

7. 150.—Senile Tuberculosis of the Bones of the Wrist.—Section of the bones of the left wrist of a man, aged 81—injected and in spirit, illustrating the above. This specimen is from the same arm as No. 7. 137, which see for full history.

The preparation consists of a longitudinal section through the radius, ulna, and first row of carpal bones, and a transverse section through the second row of carpal bones.

He had noticed his wrist enlarged for some months, but never had any pain in it. He could move it freely, and complained only of the disfiguration from the swelling.

Non-vascular areas like that in the radius are seen in various stages of progress in the carpal bones. There are also caseous masses within the joints, especially between the radius scaphoid, and in the lower radio-ulnar joint, which is distended with them.

In many places the articular cartilage is entirely removed. The well-authenticated absence of pain on movement is therefore remarkable, but it may possibly be explained by the non-vascular caseous condition of the bone below the eroded cartilage.

G. C. 2811.

7. 151. Tubercular Disease of the Wrist, involving the Carpus.—Lower ends of the radius and ulna, and bones of the wrist—macerated, showing extensive changes.

"Case where an incurable caries affecting all the bones forming the wrist-joint rendered the removal of the limb necessary, in order to save the life of the patient. The disease was most extensive, and had lasted for a very considerable period, the patient availing himself of all sorts of advice. The bones, as now macerated and put up, show the extent of the disease. The phalanges of the fingers were even altered in structure, being so soft as to admit of a delicate soft wire being thrust through them in all directions."

Much new bone has been thrown out on the dorsal and palmar aspects of the carpus and radius, with rarefaction and absorption of the articular surfaces. G. C. 1196.

7. 152. Tubercular Disease of the Wrist, destroying the Carpus.—Lower ends of a right radius and ulna and bones of the wrist—macerated, illustrating the above.

The patient was an elderly gentleman, whose arm was amputated.

Most of the carpal bones have disappeared, and those that remain are irregular, owing to new periosteal bone formation on their dorsal and palmar surfaces, and to erosion of their articular surfaces. The lower end of the radius is similarly affected, and so is that of the ulna, but to a less extent.

B. C. II. M. 57.

c. Spontaneous cure after tubercular disease of the wrist.

7. 153. Anchylosis after Tubercular Disease of the Wrist.—Lower end of a left radius with adjacent carpal and three inner metacarpal bones, anchylosed into a common mass—macerated.

There has evidently been absorption of parts of the bones, and the case has no doubt therefore been one of cured tubercular disease. W. C. H. 46.

d. Results of operations for tubercular disease of the wrist.

7. 154. Return of Tuberculosis after Excision of the Wrist.—Section of a left wrist, after excision—in spirit.

"The sinuses on the dorsum continued to discharge, and as the patient—a young woman—was suffering in general health, the arm was amputated."

Fibrous tissue occupies the place of the carpal bones, but within it there are tubercular foci, with which the sinuses communicate, and which account for the continued discharge.

G. C. 3301.

Presented by A. G. MILLER, F.R.C.S.E., 1891.

7. 155. Return of Tuberculosis after Excision of the Wrist.—Section of the radius, with middle metacarpal bone and phalanges, from the previous case—macerated.

There is enlargement of the lower end of the radius by new periosteal formation, and the new bone itself is partly eroded near the lower end. G. C. 3302.

Presented by A. G. MILLER, F.R.C.S.E.

3. *Changes—Inflammatory and otherwise—due to the disease known as "Arthritis deformans," "Chronic Rheumatic Arthritis," "Poor Man's Gout," etc.*

* KNEE-JOINT.

7. 156. Early Stage of Arthritis Deformans.—Lower end of a left femur and patella from an old man—injected with carmine, and in spirit, showing changes chiefly in the patella.

The patient was a rather done man of 56, whose lower limb was amputated above the knee for a compound fracture of the leg.

Across the patella the cartilage is deeply furrowed, the

* The knee-joint is taken first, because the early stages of the disease are better illustrated in this Museum by the specimens of that joint than by those of any other.

margins of the furrow being irregular. Round the articular margin the cartilage has been slightly absorbed by the synovial membrane, and the affected surface as well as the margins of the furrow have been vascular and are injected. One or two patches of the injection are seen upon the cartilage of the femur. The depression on the cartilaginous surface of the trochlea was probably done accidentally while preparing the specimen. The joint otherwise may be considered normal.

G. C. 3201.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

7. 157. Early Stage of Arthritis Deformans(?).—Left knee-joint of an adult—injected and laid open from the front—in spirit, showing changes in the cartilage and synovial membrane.

The patient had many chalk stones in different parts of his body.

The cartilage on the trochlear surface of the femur is deficient at the centre, and over the condylar surface on both sides it shows numerous small nodules. The cartilaginous surface of the patella is irregularly eroded round the margin, and has lost its smoothness over the rest of the surface. The synovial membrane round the patella and on the femur presents numerous finely fringed processes. B. C. II. M. 14.

7. 158. Early Stage of Arthritis Deformans.—A left knee-joint laid open by throwing down the patella — in spirit, showing changes chiefly in the cartilage.

The specimen is from a woman aged 62, whose limb was amputated for senile gangrene.

The articular margin of the femur has begun to enlarge, and forms an irregular shelf projecting beyond the surface of the condyle. There is a small patch of eburnated bone at the upper and outer part of the trochlear surface, and below it the cartilage is shreddy, *i.e.*, is in the stage which precedes ebur-

nation. The greater part of the cartilage on the patella is in the pile-of-velvet condition. G. C. 3157.

Presented by A. G. Miller, F.R.C.S.E.

7. 159. Early Stage of Arthritis Deformans.—Right knee-joint of an adult, laid open from the front by turning down the patella. The specimen is in spirit, showing changes in the synovial membrane and cartilage.

The patient was a healthy man of 50, whose leg was amputated on account of a bad railway smash. His only symptom of trouble in the knee had been occasional stiffness.

There is a fibrous shreddy condition, and a wearing away of the cartilaginous surfaces of the trochlea, and similar but less advanced changes on the patella. There is also a slight overgrowth of bone at the articular margin of the trochlear surface. The synovial membrane round the patella is markedly fringed. G. C. 2884.

7. 160. Early Stage of Arthritis Deformans.—Lower end of a right femur and patella—in spirit, showing changes in the cartilage.

The patient was aged about 50, and his leg was amputated above the knee for a railway smash. As in the previous case, he had had occasional slight stiffness in the knee, to which, however, he had paid no attention. At the time of the accident he was not aware that there was anything the matter with the joint.

The cartilaginous surface of the patella is irregular, especially at its lower part. There is also some roughening and wearing down of cartilage on the trochlear surface of the femur, while along the articular margin of the inner condyle a narrow band of cartilage has disappeared. Round the patella the synovial membrane is slightly fringed. G. C. 3129.

Presented by Charles W. Cathcart, F.R.C.S.E.

7. 161. Advancing Arthritis Deformans.—Right knee-joint of an adult, with the ligaments and muscles dissected off to expose the joint—in spirit.

The cartilaginous surface of the femur is worn away at several places, especially on the trochlear surface, while the articular margin projects outwards as a shelf all round. There is an "adimentary bone" upon the tibia in front of the anterior crucial ligament. Changes similar to these on the femur, but less advanced, are seen on the tibia. The articular surface of the patella is for the most part bared of cartilage, and at one spot it is eburnated. One or two pendulous processes are attached to the upper part of the patella. W. C. H. 40.

7. 162. Arthritis Deformans, with marked Fringing of the Synovial Membrane.—Right patella with adjacent soft parts—in spirit, illustrating the above.

The synovial membrane is covered by a mass of long fringed processes. The cavity of the joint must have extended upwards for a considerable distance, and the interior of the extension has been furnished with similar processes. The cartilaginous surface of the patella seems normal.

B. C. II. M. 20.

7. 163. Arthritis Deformans, with marked Fringing of the Synovial Membrane.—Lower end of a left femur, with the adjacent synovial membrane, from the subject from whom the last specimen was taken—in spirit.

The synovial membrane is covered by a similar remarkable outgrowth of fringed processes, and the pouch above the patella has also been enlarged. It should be noted that although the changes in the synovial membrane are so advanced, there is no lipping or shelving out of the articular margin, and scarcely any change in the cartilage. The detachment of a piece of cartilage on the inner condyle may have been due to an accident. B. C. II. M. 21.

7. 164. Arthritis Deformans, involving the Patella.—Patella of an elderly person—macerated, illustrating the above.

There is a slight enlargement at the articular margin, and a development of bone in the position of the ligamentum patellæ.

B. C. II. M. 60.

7. 165. Arthritis Deformans, involving the Patella.—Two patellæ, apparently from the same subject—macerated, showing characteristic changes.

The articular surface has been bared of cartilage and marked by deep grooves, with an eburnated surface. There is also some enlargement at the margin of each bone. B. C. II. M. 25.

SACRO-ILIAC JOINT.

7. 166. Arthritis Deformans, involving the Joints of the Pelvis.—Pelvis of an elderly person—macerated, illustrating the above.

The bony ridges are well marked, but the bone itself is somewhat light. There is anchylosis of both sacro-iliac joints at their upper margins. There is also enlargement round the upper border of the body of the first sacral vertebra. The margins of the acetabula are irregular from slight bony overgrowth, but the cavities themselves are somewhat shallower and wider than usual, as if they had yielded to pressure.

G. C. 997.

HIP-JOINT.

7. 167. Early Stage of Arthritis Deformans.—Bones forming a left hip-joint—in spirit, illustrating the above.

The cartilage on the femur is at the upper part somewhat shreddy and irregular, and at one spot it has been worn away, showing an eburnation of the bone below. The enlargement at

the articular margin has just begun. The bony ridges on the great trochanter are unusually well marked.

G. C. 1122.

Presented by Robert Knox, F.R.C.S.E.

7.168. Advancing Arthritis Deformans.—Right hip-joint of an elderly person, in spirit, with the muscles and ligaments dissected off—illustrating the above.

The cartilage at the upper and anterior part of the head has been replaced by smooth bone. Elsewhere the place of the cartilage is taken up by a vascular substance, which has been ossifying, and has at many places, especially at the margin, developed irregular pieces of new bone. Some new bone has also been thrown out on the neck, especially along the front and at the top. G. C. 1120.

Presented by Robert Knox, F.R.C.S.E.

7.169. Advanced Arthritis Deformans.—Bones forming the right hip-joint of an elderly person—macerated, showing considerable changes on the articular surfaces.

The head of the femur is enlarged, chiefly by the development of new bone on and round the margins of the articular surface. The central portion of the head of the bone has lost the usual depression for the ligamentum teres, and is smooth and eburnated, although somewhat porous in one or two places. The development of new bone extends on to the neck, especially in front. The cavity of the acetabulum is shallow, partly by enlargement at the upper side, and partly by filling in at the bottom, where the usual deficiency at the attachment of the ligamentum teres has been bridged over. The upper part is smooth and partly eburnated. There has been an irregular deposit of new bone around the cotyloid margin. G. C. 1230.

7. 170. Advanced Arthritis Deformans.—Bones forming the

left hip-joint of an elderly person—the femur sawn vertically—macerated, illustrating the above.

The head of the femur is enlarged, chiefly by a new bone formation at the margins, which extends to the neck. The upper part of the head is smooth and shining, and, except that it is porous in places, might pass for a portion of a billiard ball. The surface of the new bone on the front of the neck and upper part of the shaft is porous and irregular. The interior of the bone shows condensation at the centre of the head, with some empty spaces near the articular margin. The cavity of the acetabulum is somewhat shallow, and the bottom is entirely filled up with new bone. The articular surface is somewhat porous above, but shows a band of eburnation all round. The cotyloid margin is irregularly prolonged, and some rough new bone has been formed all round and beyond it. The capsular ligament is said to have had bony excrescences attached to it.

G. C. 1481.

Presented by Professor J. W. Turner and A. Watson, F.R.C.S.E.

7. 171. Advanced Arthritis Deformans, with Locking.—Bones forming the right hip-joint of an elderly person, in which the head of the femur is locked within the acetabulum—macerated.

There is some irregular enlargement at the articular margin of the head of the femur. The lesser trochanter has been entirely worn away against a piece of the bone, which projects from just below the acetabulum, and the adjacent surfaces are adapted to one another. The hip-joint has been fixed in a strongly adducted position. The margin of the acetabulum is deepened, and has grown inwards so as to envelop the head of the femur. A slight range of movement is possible between the femur and the acetabulum, but it is doubtful whether this existed before maceration. There is a small semi-detached scale of bone, with a depression near it in the cavity of the ilium, the nature of which is obscure.

This specimen was formerly described as one of "scrofulous disease," but arthritis deformans seems a more probable cause of the condition. B. C. II. M. 10.

7. 172. Advanced Arthritis Deformans (?) with Anchylosis.—Posterior half of a vertical transverse section of a right hip-joint—soft parts cleaned off—in spirit, illustrating the above.

"This disease took place eight years before the patient's death, but with what symptoms I could not learn. He had acquired, however, by throwing back the pelvis, the power of walking, although the anchylosis had formed in the complete bent state of the joint. There is still a cartilaginous crust between the bones; but very little alteration in the form of either bone has taken place, nor has the anchylosis been attended with much adhesive ossific inflammation."

"Presented to me" (Mr G. Wilson) "by Mr Daw, house-surgeon to St. George's Hospital" (1808).

The lower side of the neck of the bone, near the head, is enlarged, and there is also some enlargement of the head itself within the acetabulum, as well as of the margins of the acetabulum.

These alterations remind one of the changes in arthritis deformans. Possibly the patient with the disease advancing had been confined to bed, and had kept the knee flexed for some time, after which it would perhaps be impossible to straighten it. W. C. H. 59.

7. 173. Advanced Arthritis Deformans, with Anchylosis.—Anterior half of the previous specimen—macerated.

There are bony outgrowths at the articular margins of the bones, and the previously noted enlargements of the head and neck of the femur are well shown. The former position of the cartilage is still recognisable. The cancellous and compact tissue of the femur remain well developed. W. C. H. 70.

7. 174. Advanced Arthritis Deformans.—Bones forming a right hip-joint—macerated, illustrating the above.

"From a man who died of disease of the hip-joint. The capsular ligament was much relaxed, and much coagulable lymph was thrown out in the cellular membrane round it. The ligamentum teres was entirely destroyed. The cartilaginous surfaces of both bones were much eroded. The acetabulum was nearly filled up with coagulable lymph. The head of the femur was dislodged from this cavity, and placed on the upper and posterior of it. The head of the bone has, from ulceration, become less, and the size of the cavity greater from the same cause. Some deposition of fresh bony matter has taken place in the innominatum in the neighbourhood of the acetabulum. (This preparation, and the history of the case, I had from Mr Brodie, 1807.)"

The head of the bone is enlarged at its circumference by new bone, which is also present on the neck in front. At the same time the upper and inner part of the head has been absorbed, but the surface of the remaining bone, though somewhat porous, is eburnated. The rest of the head of the bone, especially on the front, is rarefied and irregular. Some new bone has been thrown out at the attachment of the gluteus maximus, on the small trochanter and along the spiral line. The alterations in the cavity of the acetabulum correspond to those of the femur; the usual gap at the bottom is filled up with rough and porous bone, and the articular surface at the upper part is eburnated. The cavity of the acetabulum is shallow, but the margin of the bone is irregularly prolonged, especially at the upper part. The above appearances are typical of "arthritis deformans." W. C, H. 43.

7. 175. Advanced Arthritis Deformans.—Bones forming a left hip-joint—macerated, illustrating the above.

"The limb was fixed by an imperfect anchylosis with the body."

The head of the femur is greatly enlarged round the margin, especially below, but at the upper and inner part it is considerably absorbed. The articular surface is porous, but eburnated over the greater part of its upper aspect. The acetabulum is partly filled up at the bottom, and is prolonged upwards and

backwards by development of bone round the cotyloid margin. The surface of the interior is porous and eburnated, like that of the femur. B. C. II. M. 81.

7. 176. Advanced Arthritis Deformans.—Upper end of a left femur—macerated, illustrating the above.

While there has been enlargement round the margin of the head of the femur, especially in front, there has been great absorption of the upper part, which thus is now below the level of the top of the great trochanter. This upper surface is fairly smooth, but has little or no eburnation, probably because locking prevented movement. The rest of the articular surface is irregular. The small trochanter has been partly absorbed.

This specimen was formerly described as a united fracture of the neck of the femur. F. P. C. 95.

7. 177. Symmetrical Alterations in the Head and Neck of Femora, probably from Arthritis Deformans.—Upper portions of a right and left femur, with a vertical section of the head and neck of the left—macerated, illustrating the above.

"The man, aged 50, had had several attacks of acute rheumatism. On admission to the hospital, he complained of a gnawing pain in the hip and shoulder-joints, and the motions of the hip-joint were considerably impaired. He died from exhaustion from a large lumbar abscess. He had been a shoemaker."

"The shaft and trochanters were unaffected, but the neck was extremely short, and the head flattened and expanded. The acetabula were correspondingly large, shallow, and irregular. Instead of being an inch higher than the trochanter major, the highest part of the head was three-quarters of an inch lower than the trochanter. The neck was only half an inch in length, and was planted lower down on the bone, especially near the great trochanter. The margin was extended so as to form an overhanging ledge below, behind, and before. The outline of the head was flat below and arched above,

having, on the whole, a somewhat square shape, with rounde d angles. The surface departed from the spherical. The depression forming the pit and groove for the round ligament was compressed so as to form a mere fissure, elongated vertically." (Struthers, *Edin. Med. Journal*, Jan. 1863.)

The absorption of the top of the heads, the irregularity of the articular surfaces, and the prolongation of their margins are changes found in arthritis deformans. The shape of the altered head is not quite characteristic, but a constant cross-legged position at his work might perhaps account for the peculiarity in this case. The symmetry is remarkable.

G. C. 3479.

Presented by Professor JOHN STRUTHERS.

7. 178. Advanced Arthritis Deformans of the Hip-joint, with Enlargement, Absorption, and Locking.—Bones forming a left hip-joint—macerated, illustrating the above.

There has been so much enlargement round the lower part of the articular margin of the femur, and so much absorption of the upper part of the head, that the tissue of the head seems as if it had been moulded roughly downwards, while the great trochanter has been proportionately raised. The new bone at the articular margin is very craggy and irregular, and the portion of bone which was in contact with the acetabulum is porous, and but very slightly eburnated, probably because the irregularity of the surfaces locked the joint, and permitted none but a very slight movement. The anchylosis has been in the flexed position. The acetabulum is enlarged round the margin, and the interior is rough and porous, with only a very slight degree of eburnation here and there. The muscular attachments on the ischium are rough. G. C. 2775.

Presented by MACDONALD BROWN, F.R.C.S.E.

7. 179. Advanced Arthritis Deformans.—Posterior half of the

vertical transverse section of a left femur and adjacent part of pelvis—macerated, illustrating the above.

The limb has evidently been fixed in a strongly adducted position, for the lesser trochanter has been atrophied by pressure against the lower part of the acetabulum. This is evident when the bones are placed *in situ*. They have, however, been mounted separately, to show the condition of the articular surfaces. There is some enlargement round the head of the bone, and considerable absorption on its top and inner sides. The surfaces of the femur and acetabulum which were in close contact are very porous, and have little or no eburnation, probably because only limited movement was permitted by the altered shape of the bones. There is considerable roughening at the point of attachment of the quadratus femoris to the femur. The acetabulum shows the usual irregular enlargement round the margin, with a facette at the front of the cotyloid notch, where it was pressed upon by the lesser trochanter. The section shows some condensation of the head and neck of the femur, with a small cavity near the articular margin above.

G. C. 921 A.

Presented by ADAM HUNTER, F.R.C.S.E.

7. 180. Advanced Arthritis Deformans.—Anterior half of the vertical transverse section of the previous specimen—in spirit.

It will be noted that there is a distinct thick layer of cartilage on what, in the macerated specimen, seems to be an enlargement downwards of the head.

The presence of cartilage upon this piece of bone, so far removed in position from that of any part of the original head, can only be accounted for in one or other of two ways. Either this is a new layer of cartilage which has formed upon new bone, or it is some of the original cartilage adhering to a portion of the original head of the bone, which has been displaced bodily downwards. As articular cartilage is seldom,

if ever, formed anew, far less in this disease where it is largely absorbed, the alternative of downward displacement of the bone seems inevitable.

G. C. 921.

7. 181. Arthritis Deformans, following Fracture of the Neck of the Femur.—Upper end of a right femur and acetabulum—macerated, illustrating the above.

"The man was aged about 60 years. Ten years previous to his death the patient slipped his foot upon a stone, but did not fall. Next day he felt swelling in his groin, and became lame ever after. A new joint had been formed. The capsular ligament was thickened, and its cavity was much increased in size. The parts had become curiously adapted to each other by absorption and new deposition of bone, so as to admit of some use of the limb."

The head and neck of the femur are entirely wanting, and the surface of the bone where the neck was attached is now quite smoothed over, there being only some irregularity round its margin. The acetabulum is greatly altered. A new surface has been hollowed out at its upper and back part by friction, evidently against the femur at the side of the neck. The remains of the original acetabulum shows irregularity of the former cartilaginous surface, with enlargement round about.

Apparently there had been an intra-capsular fracture of the neck, with an after absorption of the ununited head.

G. C. 1479.

Presented by Professor J. W. Turner and A. Watson, Esq.

7. 182. Arthritis Deformans, following Fracture of the Neck of the Femur.—Upper end of a right femur with the innominate bone—macerated, illustrating the above.

This specimen was originally entered as a fracture in which union of the fibro-cartilage had taken place.

There is considerable irregularity all over the innominate bone and femur, especially at the muscular attachments. The acetabulum is filled in, but this on examination of the section proves to be due to an anchylosis of the head of the femur within the acetabulum. On the other hand, the head

and neck of the femur are wanting at their normal place, and a flat surface on the femur indicates where the neck should have joined it. The outer surface of the bone which fills the acetabulum has evidently rubbed against the site of the neck, for although the opposite surfaces are for the most part porous, they each have patches of eburnation. There are no appearances at the line of junction of the head and acetabulum which would indicate anchylosis from arthritis deformans *before* the fracture.

For a comparatively recent example of a detached head lying in the acetabulum, see No. 3. 184. G. C. 1849.

Presented by P. D. Handyside, F.R.C.S.E., 1837.

SHOULDER-JOINT.

7. 183. Advancing Arthritis Deformans of the Shoulder, with Absorption of the Tendon of the Biceps.—Upper half of the right humerus of an old person, cleaned of all soft parts, except some of those attached to the bicipital groove, and dried, illustrating the above.

The biceps tendon, at its upper end, is represented by a hollow tube, attached to the upper part of the bicipital groove. The articular surface seems fairly normal, but there is some enlargement at the articular margin. G. C. 3477.

Presented by Professor John Struthers.

7. 184. Advancing Arthritis Deformans of the Shoulder, with Absorption of the Tendon of the Biceps.—Upper end of the left humerus of an old person, cleaned of all soft parts, except those attached to the bicipital groove, and dried, illustrating the above.

The tendon of the biceps is somewhat diminished in size, and has been adherent in front to the lesser tuberosity. There is considerable irregularity round the articular margin of the bone, especially at the upper part. G. C. 3477.

Presented by Professor John Struthers.

7. 185. Advancing Arthritis Deformans of the Shoulder, with Absorption of the Tendon of the Biceps.—Upper end of the right humerus of an old person, cleaned of all soft parts, except the remains of the biceps tendon, and dried, illustrating the above.

The biceps tendon is reduced to an imperfect tube, which is attached to the margins of the upper end of the bicipital groove. Some irregularity of the bone is seen round the arti cular margin, more especially at the upper part.

G. C. 3478.

Presented by Professor JOHN STRUTHERS.

7. 186. Advancing Arthritis Deformans of the Shoulder, with Absorption of the Tendon of the Biceps.—Upper part of left humerus of an old person, cleaned of all soft parts, except the remains of the biceps tendon, and dried, illustrating the above.

The biceps tendon at the upper part is reduced to an imperfect tube, which is attached to the margins of the upper end of the bicipital groove. Some irregularity of the bone exists round the articular margin, especially at the upper part.

G. C. 3478.

Presented by Professor JOHN STRUTHERS.

7. 187. Advancing Arthritis Deformans, with Absorption of the Tendon of the Biceps.—Right shoulder of an elderly person, laid open from above—in spirit, illustrating the above.

The following is Dr Knox's description of the specimen:—"Altered condition of that portion of the tendon of the biceps flexor cubiti which passes into the shoulder-joint. On the cavity of the joint being exposed, the donor remarked that the tendon passing through the joint did not follow the usual

course. It adhered along its whole course to the internal surface of the capsule, and was indeed reduced to a few fibrous and cellular-looking threads, which could be traced with difficulty. The tendon of the biceps as high as its passage into the groove of the humerus, and as high as that point where the synovial capsule is reflected upon it from off the fibrous capsular ligament could be readily traced; but here the tendon disappeared; a few of its fibres, assuming a cellular appearance, adhered to the margins of the groove in the bone, and a certain number might also be traced from the termination of the groove closely adhering to the synovial membrane, and almost identified with it, as far as the usual insertion of this tendon into the upper portion of the fibro-cartilaginous ring of the glenoid cavity. Since the occurrence of this case the donor has met with three others, closely resembling each other. (See a paper on the subject in the *London Medical Gazette*, No. 14, Saturday, March 8, 1828.) E. Stanley, Esq., in the same periodical for December 6, 1828, states that he has since remarked three similar cases. He seems to be of opinion, and gives some interesting cases to show, that the tendon of the biceps can be ruptured by certain forcible movements of the arm, without being accompanied with the dislocation of the humerus. The symptoms are severe, and the time required for the reparation of the injury much more considerable than in the case of a common bruise. Mr Stanley further states that in two cases of dislocation of the humerus, which he had an opportunity of examining, he found the tendon of the biceps entire."

It is now known, as the previous four specimens illustrate, that these are not cases of rupture of the biceps tendon, but of its absorption in the progress of arthritis deformans.

The central portion of cartilage on the head of the humerus is worn away, and round the margin there is some enlargement and irregular outgrowth of bone. There is some irregularity of the cartilage at the lower part of the glenoid cavity.

G. C. 1121.

Presented by R. Knox, F.R.C.S.E.

7. 188. Advanced Arthritis Deformans, with Alteration of the Articular Surfaces.—Right humerus and scapula of an elderly person—macerated, illustrating the above.

The articular surfaces are both flattened out, and the globular character of the head of the humerus has been quite lost. Round the articular margins of both bones there are numerous irregular outgrowths of bone. The bicipital groove is lost, there being only a shallow depression at the upper end to mark its former site. The shaft of the humerus is curved outwards at the attachment of the deltoid. The upper part of the greater tuberosity has been in contact with the acromion process, and the bony outgrowths on the glenoid cavity reach to the top of the coracoid process. There is little or no alteration on the lower articular surface of the humerus. There must have been considerable shortening of this arm.

These appearances of the shoulder-joint are such as might have been artificially produced had the bones been softened to a putty-like consistence and then pressed together.

G. C. 1193. a.

Presented by Professor JAMES RUSSELL.

7. 189. Advanced Arthritis Deformans, with Alterations in the Shaft of the Humerus.—Right humerus and scapula —macerated, illustrating the above.

As in the previous preparation, the head and glenoid cavities have apparently been compressed and flattened against one another, and irregular masses of new bone formed round the articular surfaces fit more or less accurately into one another. The greater tuberosity, in this specimen also, reaches to the acromion process, and the upper part of the shaft of the humerus is very much altered. There is much irregular thickening at the level of the attachment of the deltoid, and at the lower part of the usual position of the bicipital groove there is an aperture leading into the bone which communicates internally with the lower edge of the altered articular surface. There

is also a smaller aperture with a blind extremity a little below the first one. The remains of the bicipital groove is seen between the upper parts of the altered tuberosities. The glenoid cavity is flattened and enlarged by growth of bone at the margins. The lower portion of the surface is rarefied. At the lower end of the bone there is considerable prominence of the muscular attachments and some irregularity of the cartilage on the capitellum. W. C. H. 39.

7. 190. Advanced Arthritis Deformans, with great Atrophy of the Humerus.—Left humerus and scapula—macerated, to illustrate the above.

The shaft of the humerus from the attachment of the deltoid upwards is curved outwards, and is flattened from within outwards, *i.e.* the reverse direction to the flattening in a rickety curve. (There is, however, one ridge in this concavity which partly corresponds to the usual development of bone in the concavity of the arch.) The outer lip of the bicipital groove is prominent below, but the inner lip can hardly be recognised anywhere. The head of the bone is wanting, having apparently been absorbed, and what represents the articular surface is irregular and at places eburnated. At the upper margin of what represents the head, there is an irregular projection of bone, as in the two previous specimens. The glenoid cavity of the scapula has been absorbed at its central parts and towards the back, while a thick ridge of bone has been thrown out all round the margins, especially above and below. The cavity thus deepened and enlarged resembles an imperfect acetabulum. The surface is irregular, being at places both porous and eburnated. When the bones are articulated, the upper part of the humerus, as in the previous specimen, comes close underneath the acromion process.

G. C. 1193.

Presented by Professor James Russell.

ELBOW JOINT.

7. 191. Advancing Arthritis Deformans.—Lower end of a right humerus, with the muscles dissected off—in spirit, illustrating the above.

The articular surface on the lower part of the capitellum is bared of cartilage and smooth. There is also some bony outgrowth at the margins of the trochlear surface. An adimentary bone about the size of a large pea is seen in the olecranon fossa, and must have interfered with the extension of the joint. G. C. 1194.

Presented by ADAM HUNTER, F.R.C.S.E.

7. 192. Advanced Arthritis Deformans.—Bones of a left elbow-joint, with the muscles and synovial membrane dissected away—in spirit, illustrating the above.

There is considerable atrophy on the inner side of the trochlea, and the articular surface has thus the appearance of being tilted up, so as to bring the inner side higher than the outer. The cartilage has been worn off the articular surfaces, and the trochlear surface, now covered by smooth bone, is marked by deep grooves. The head of the radius is greatly enlarged all round, while its cartilage is partially eroded. The coronoid and olecranon fossæ are shallow, but a new depression has been formed above the capitellum for the enlarged head of the radius. The articular margins of the humerus and ulna are enlarged, and one adimentary bone is seen on the coronoid process of the ulna, and another on the back of the trochlear surface. G. C. 3246.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

7. 193. Much Advanced Arthritis Deformans.—Bones of a right elbow, muscles cleaned off—in spirit, illustrating the above.

The joint has been opened, and the humerus rotated

upwards from its articulation with the bones of the forearm, so as to display the articular surfaces. The lower end of the humerus is so greatly atrophied that its original shape is not recognisable. The whole of the outer condyle, with some of the bone above it, is now wanting. Large adimentary bones have formed in the synovial membrane. There is a large one above the olecranon process, another at the inner condyle of the humerus, and other smaller ones are scattered round the joint. The articular surfaces of the joint show smooth exposed bone at some places. At others they are covered with a shreddy, fibrous material, but nowhere with cartilage. The synovial membrane, where it has been left, shows numerous processes —some pendulous and thick, and others fine and shreddy.

This specimen was formerly described as one of fracture and dislocation, involving the elbow-joint, not, however, from a history of the case, but from an interpretation of the appearances. The view now taken, however, seems the more correct one, as the specimen quite corresponds with an extreme degree of the changes seen in other examples of arthritis deformans.

G. C. 784.

Presented by Drs WATSON and CULLEN.

7. 194. Much Advanced Arthritis Deformans.—Plaster of Paris cast of a right elbow and forearm, showing great deformity of the elbow.

The bones of the forearm have been drawn up on the outside, past the lower end of the humerus. Although there is no history to that effect, this might have been a cast of the previous elbow-joint before dissection. It was entered as a cast of a dislocation. F. P. C. 702.

7. 195. Advanced Arthritis Deformans of the Elbow, with an Ununited Fracture of the Upper End of the

Ulna.—Left elbow-joint, with the muscles cleaned off—in spirit, section removed from the inner side, illustrating the above.

There has been firm anchylosis of the elbow. The lower end of the humerus is enlarged, and the ulna even more so, and the irregularities have interlocked. Fibrous tissue intervenes between the articular surfaces at most places. What was formerly the capitellum is now an irregular hollow on the outer side of the humerus, with a margin of new bone round it. The head of the radius is greatly enlarged, and has the appearance of having been shifted bodily outwards. Its articular surface, like that of the humerus, is smooth and eburnated, while round about it shows the usual irregularity. The broken ends of the ulna are surrounded by a capsule, and there is the cavity of a false joint between them. A quantity of fibrous tissue at the back unites the fragments to one another and to the adjacent part of the radius. G. C. 3069.

Presented by William Russell, M.D.

7. 196. Arthritis Deformans of the Elbow with an Ununited Fracture of the Upper End of the Ulna.—Macerated section of the humerus and ulna from the foregoing specimen, showing the interlocking of the altered articular surfaces. G. C. 3069.

Presented by William Russell, M.D.

7. 197. Anchylosis after Old-standing Arthritis Deformans.—Adjacent portions of a right humerus and ulna—macerated, illustrating the above.

While the anchylosis is osseous and complete at the back, there is a furrow of separation on the front. The lower end of the humerus seems to have been partially absorbed, while the upper end of the ulna has become enlarged on the front and

outer side, where a piece of new bone occupies the position usually taken up by the head of the radius. There is an irregular facet upon this piece of new bone which extends on to the humerus, and must have been for articulation with the radius. Lower down on the ulna is seen a small hollow facet, which has evidently also been for the radius at the tubercle. Judging from the position of the anterior ridge of the ulna, the bones of the forearm have been fixed in pronation.

The alternatives in deciding as to the nature of this condition lay between the above and a congenital malformation which indeed it in many ways resembles. B. C. 2. M. 51.

JOINTS OF THE HAND.

7. 198. Arthritis Deformans affecting Inter-phalangeal Joints.—Plaster cast of a right hand, illustrating the above.

There is comparatively little change in the thumb, but there is distinct enlargement at the inter-phalangeal joints of the fingers, especially between the last two phalanges of the middle and ring fingers, which are crooked as well. G. C. 3068.

Presented by BRYAN C. WALLER, M.D.

For changes in the vertebræ due to arthritis deformans, see series illustrating the spine, 7. 258 to 265.

Changes due to Rheumatism.

7. 199. Rheumatic Changes in the Metacarpo-phalangeal Joints.—Cast in glue and glycerine of the back of the right hand of a young woman—illustrating the above.

She had suffered from several attacks of acute rheumatism, leaving alterations in several joints, of which this hand was perhaps the worst.

There is enlargement at all the metacarpo-phalangeal joints, and the fingers are flexed to the ulnar side, the thumb being bent acutely forward. G. C. 2899.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

7. 200. Rheumatic Changes in the Metatarso-phalangeal Joints.—Heads of left metatarsal bones—in spirit, illustrating the above.

From the foot of a man, aged 45, whose leg was amputated for a chronic ulcer, ending in epithelioma. The bones of the foot were anchylosed and considerably altered in many ways.

The cartilage of the two outer metatarsals is marked by grooves filled with fibrous tissue. The head of these two bones is irregular in shape. On the two inner toes the cartilage is at places worn away, especially on the under side. That on the second toe is cut to expose the bone.

The changes in this specimen may be due to causes other than rheumatism, although the condition resembles what is described as due to rheumatism. G. C. 2794. c.

Presented by JOHN DUNCAN, F.R.C.S.E.

7. 201. Rheumatic Nodules in the Knee-Joint.—Cast in glue and glycerine of the knees of a child affected with rheumatism.

On each side there are numerous projections caused by the nodules, which were present in the synovial membranes round and above the patella. G. C. 3298.

Presented by JOHN THOMSON, M.D., **1891.**

Joint Affections caused by Miscellaneous Organisms—Gonococcus.

7. 202. Gonorrhœal Inflammation of the Knee-joint.—Cast in glue and glycerine of the left knee of a man suffering from so-called gonorrhœal rheumatism.

The front of the knee shows the shape typical of acute synovitis. G. C. 2882.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

Anchylosis from conditions, the nature of which is obscure.

7.203. Anchylosis of the Astragalo-calcarcean Joint.—Section of the astragalus and os calcis of a young person—in spirit.

The excision of the ankle-joint had been ineffectively performed, and amputation became necessary.

The cartilaginous surface of the astragalus and os calcis are adherent. There has been no inflammation in this joint, and there is no sign of granulation tissue. G. C. 2842.

Presented by Professor T. ANNANDALE.

7.204. Anchylosis of the Upper End of the Tibia and Fibula.—Right tibia and fibula—macerated, and showing the above.

The upper ends of the bones are united by a bridge of new bone fusing them together. The vascular pores on both bones are somewhat larger than usual, but there is no sign of disease. This specimen resembles those of anchylosis in multiple exostosis (6. 377), and may be an allied condition.

B. C. 2. M. 33.

IV. NEW GROWTHS INVOLVING JOINTS.

7.205. Osteo-Sarcoma of the Head of the Tibia.—Upper ends of a left tibia and fibula — macerated, illustrating the above.

This specimen is referred to by Dr James Russell in his chapter on "Uncommon Disease," in his treatise upon "The Knee-joint." Although the particulars of this case were not detailed, the symptoms described in a general way were those of a rapidly increasing sarcoma of the bones forming the joint.

The original texture of the head of the tibia is greatly altered, being in many places absorbed, while what remains is irregularly eroded and rarefied, so as to resemble the effects of a severe septic inflammation. All round the upper end, where

the bone is not eaten away, spicules and plates of new bone are thrown out from the surface, as in many of the specimens of sarcoma in Series 6. The upper end of the fibula is bent outwards from the tibia, and there is a space between it and the tibia, which has evidently been occupied by a mass of the tumour. Plates of new bone appear to grow from the fibula at the front of the head, but it is more probable that they are part of the original tibial tumour here pressed against the fibula, and dried *in situ*. G. C. 1145.

Presented by Professor JAMES RUSSELL.

7. 206. Sarcoma involving the Knee-joint.—Section of a left knee-joint—in spirit, illustrating the above.

The joint had been enormously enlarged owing to the growth of a tumour, which on the outer side has burst through the skin, and fungated in large masses.

This has apparently been a sarcoma of the soft parts near the joint, which it has enveloped in its growth.

F. P. C. 758.

See also Nos. 6. 402-404.

7. 207. Sarcoma (?) involving the Carpal Bones. — Left wrist and metacarpal bones injected, and partially dissected—in spirit, illustrating the above.

This specimen is thus described by Benjamin Bell in his treatise on "Diseases of Bones," pp. 160, 161 :—"The blood in this case was contained in numerous distinct bony cysts, each of which was lined by a highly vascular membrane. The blood also was fluid, and had not concreted in the manner described by M. Breschet and myself. There was no pulsation in the tumour previous to the amputation of the hand, and on being punctured, it discharged dark-coloured blood."

This disease has involved the carpal bones and joints, and seems to consist of smooth lined cysts, surrounded by a very vascular substance ; probably a cystic sarcoma. G. C. 319.

Presented by JOSEPH BELL, F.R.C.S.E.

Diseases of the Spinal Column.

I. Abnormalities in Growth or Development.

See No. 6. 3. ; also under nervous system for changes in spina bifida.

II. Changes produced by Conditions affecting the Nutrition and Growth of the Spinal Column.

A. Old age. For senile osteo-malacia, see 6. 8.; for changes due to arthritis deformans, see 7. 258 to 265. Other specimens wanted.

B. Changes from local conditions affecting the nutrition and growth of the Spine.

Lateral Curvature of the Spine.

7. 208. Early Stage of Lateral Curvature.—A spinal column, pelvis, and thorax—macerated, illustrating the above.

The patient died of disease of the lungs.

The spinal column is in a somewhat stooping position, and there is a slight curvature with convexity to the left in the dorsal region. The thorax on the right side is compressed, the ribs being approximated.

Originally entered as an illustration of the form of curvature depending upon contraction of the chest from collapse of the lungs. B. C. 1. 3. M. 21.

Figured in Shaw on "Distortion," plate iii. fig. 1.

7. 209. Early Stage of Lateral Curvature.—Cervical dorsal and upper part of lumbar portion of a spine, with ribs, and part of manubrium sterni—macerated, illustrating the above.

A gentle lateral curvature is seen convex to the right from the second dorsal vertebra downwards, and with a slight rotation of the bodies towards the convexity. The ribs on the concave side are, as usual, pressed together, while those on the convex side are separated. Owing to the very slight amount of rotation, the projection backwards of the angles of the ribs on the convex side is only just appreciable, while the flattening

of the angles of the ribs on the concave side is masked by the compression of the ribs together. The compression of the left side of the chest, and opening out of the right side, must have produced a corresponding depression of the left shoulder, and elevation of the right one. B. C. 1. 3. M. 14.

7. 210. Advancing Lateral Curvature of the Spine.—Spinal column and pelvis of a woman—macerated, showing alternating curves in the dorsal and lumbar regions.

The first curve, beginning from above, is towards the right side, and has its maximum about the fourth dorsal vertebra. The second curve is towards the left side, and reaches its maximum at the tenth dorsal vertebra.

When viewed from behind, the curvature seems to begin about the third dorsal vertebra, and extends from that part downwards towards the left. B. C. 1. 3. M. 5.

Figured in Shaw on "Distortion," plate i. fig. 1.

7. 211. Advancing Lateral Curvature.—Cervical, dorsal, and upper lumbar portion of a spine, with the ribs attached—macerated, illustrating the above.

There is a curve to the left in the cervical and upper dorsal region, having its maximum at the third dorsal vertebra. There is also a very slight curve to the right in the lower dorsal vertebræ, reaching its maximum about the ninth vertebra. There is a slight rotation of the vertebræ towards the convexity of the upper curve, and, in consequence, the upper ribs on the left side are raised and separated, and have their angles projected backwards, while the corresponding ribs on the opposite side have their angles flattened, and their shafts thrown together and depressed. In the lower ribs the angles are somewhat increased on the right side, and flattened on the left, corresponding to the alternating convexity of the curve.

B. C. 1. 3. M. 19.

7. 212. Lateral Curvature, with Anchylosis.—Cervical and dorsal vertebræ, with the ribs attached—macerated, illustrating the above.

The patient died of consumption.

The spine, as a whole, is bent forward. There is a lateral curve to the left, in the upper dorsal region, having its maximum about the fourth dorsal vertebra; and one slightly to the right in the lower dorsal region. The upper ribs on the left or convex side are raised and opened out, the angles projecting backwards, while those on the concave or right side are compressed, and the angles flattened. The bodies of the fifth, sixth, seventh and eighth dorsal vertebræ are fused together, and some anchylosis has occurred between the eighth, ninth, and tenth dorsal vertebræ. B. C. 1. 3. M. 20.

7. 213. Old-standing Lateral Curvature.—Last cervical, dorsal, and two upper lumbar vertebra, with the ribs attached—partially dissected and dried, showing alternating lateral curves.

A curve to the left in the upper dorsal region has its maximum about the third vertebra, and one to the right in the lower dorsal region has its maximum about the tenth vertebra. Apparently there has been another curve to the left in the lumbar region. There is a slight rotation of the vertebræ towards the convexity, with corresponding changes in the ribs, as noted in the previous specimens. The first rib is not as much elevated as might have been expected. This may have been due to faulty mounting. B. C. 1. 3. M. 15.

7. 214. Advanced Lateral Curvature.—Cervical, dorsal, and lumbar regions of a spine, with portions of ribs attached—macerated, illustrating the above.

From an adult who died of disease of the lungs.

There is an alternating series of lateral curves. The principal curve is in the lower dorsal region. Its convexity

is to the left, and its maximum about the eighth dorsal vertebra. There are also compensating curves to the right in the upper dorsal and lumbar regions respectively. The rotation of the bodies of the vertebræ towards the convexity is well shown, and in the main curve to the left the corresponding changes in the ribs are also well marked. Thus there is a projection of the angles backwards at the convexities, *i.e.* below on the left and above on the right; and a flattening of the angles at the concave portions, *i.e.* below on the right and above on the left. It should be noted, however, that the ribs at the convexity or left side below are not separated, but are rather thrown together. This may be due to the effect of the pressure of the ribs from above. Figured by Shaw "on Distortion," plate 1, fig. 3, "as a less frequent form of lateral curvature combined with stoop, caused by standing or sitting in a bent position." B. C. 1. 3. M. 8.

7. 215. Advanced Lateral Curvature of the Spine.—Spinal column, from third cervical vertebra downwards, with pelvis —partly macerated, illustrating the above.

There is a series of alternating lateral curves, *i.e.* to the left in the upper dorsal and in the lumbar region, and to the right in the mid-dorsal and in the cervical region. The spine, as a whole, is bent forwards, and the normal curves are as usual diminished. The usual rotation of the bodies towards the convexity is best seen in the strong curve to the right in the mid-dorsal region. A development of bone at the inter-vertebral borders from arthritis deformans is well seen on the left side of the eighth, ninth, tenth, eleventh, and twelfth dorsal, and first lumbar vertebræ; and on the right side of the second and third lumbar vertebræ. Figured by Shaw "on Distortion of the Spine," as a "Serpentine Curve," plate 1, fig. 2. W. C. G. 14.

7. 216. Advanced Lateral Curvature.—Spinal column from the fourth cervical vertebra downwards, with the pelvis and thorax —partly macerated, illustrating the above.

The spine, as a whole, is bent forward. The head has probably been thrust to the left. There is a marked curve to the right extending over the cervical and dorsal regions, with its maximum convexity at the sixth dorsal vertebra. Slight compensating curves to the left are present in the cervical and lower dorsal regions respectively. The vertebræ in the main curve are rotated towards the convexity as usual. The angles of the ribs on the right side are consequently projected backwards, and those on the concave or left side are flattened; but the uppermost and lowermost ribs on each side are altered in the reverse way to those about the middle of their own side in accordance with the compensating curves. The ribs on the concave or left side are compressed, especially about the middle, while those on the right side, although closely approximated at their angles, are elsewhere widely separated. W. C. G. 13.

Figured by Shaw "on Distortion," plate 3, figs. 2 and 3.

7. 217. **Advanced Lateral Curvature.**—Spinal column, with the pelvis, portions of ribs, and part of skull attached—partly macerated, illustrating the above.

The specimen shows in a marked degree alternating lateral curves, with loss of the usual antero-posterior curves. There is a strong curve to the left in the lumbar region, another to the right in the mid-dorsal, and a third slight one to the left in the upper dorsal region. There is the usual rotation of the bodies of the vertebræ towards the convexity, with corresponding alterations in the ribs, *i.e.* a projection backwards of the angles on the right side in the mid-dorsal region, and to the left side in the upper dorsal region, with flattening of the angles of the opposite ribs in each case. Owing to the obliquity of the bodies of the vertebræ, the projecting angle of the fifth rib on the right side is opposite the slightly projecting angle of the fourth rib on the left side, but examination will show the real relation of the ribs. As is usual in such cases, the articular and transverse processes, as well as the heads of the ribs, are compressed in the concavity of the curve, and the articular processes and laminæ in many

places are partially anchylosed. The aorta is seen to follow the abnormal curves of the spine. G. C. 3205.

Presented by MACDONALD BROWN, F.R.C.S.E.

7. 218. Advanced Lateral Curvature of the Spine.—Dorsal and lumbar portion of the spine with pelvis—partly macerated, illustrating the above. A section was originally made of the preparation, but as the bone was found to be friable, it was considered best to replace the parts.

There is a very extreme curve to the right in the mid-dorsal region, possibly due to tilting of the pelvis. The usual rotation of the bodies of the vertebræ to the convex side, with compression and anchylosis of parts in the concavity, is well seen. The natural curves are obliterated. The pelvis is roomy and fairly natural, except that the iliac crests are flattened.

B. C. I. 3. M. 11 and 12.

7. 219. Advanced Lateral Curvature, with Excessive Distortion.—Spinal column, thorax, and pelvis—macerated, illustrating the above.

The patient, a man who lived to nearly the age of 50, died of apoplexy.

There is an extremely acute lateral curve to the left in the lower dorsal region, with a compensating curve to the right in the upper dorsal region. The rotation of the vertebral bodies is so complete in the lower dorsal region that the front of some of them looks obliquely backwards. The usual increased projection of the angles of the ribs at the convexity, and flattening at the concavity, is so marked that the lower ribs on the left side are like flattened plates rolled round the bodies of the vertebræ; while on the right side, they are nearly straight. The compressed parts in the concavity are in many cases anchylosed. Figured by Shaw "on Distortion," plate 4.

B. C. I. 3. M. 17.

7. 220. Lateral Curvature—Bone Changes.—Three anchylosed dorsal vertebræ, probably seventh, eighth, and ninth—macerated, illustrating the above.

The vertebræ have evidently been portions of a lateral curve with its convexity to the right, and show advanced changes in the bone. At the concavity the bodies are greatly compressed, and the upper two have lost more than half their vertical diameter. The intervertebral space is narrowed. The articular processes and laminæ are compressed and firmly anchylosed together, and the adjacent parts are atrophied. It is interesting to notice that the pedicles have diminished in size along with the other parts, although the nerves on the intervertebral foramina must have fended off direct bony pressure from them. Possibly the pressure upon the articular processes at one end, and upon the bodies at the other end of the pedicles, may have led to atrophy of the intervening pedicles themselves. G. C. 986.

7. 221. Lateral Curvature—Bone Changes.—Section of part of a dorsal region of the spinal column—macerated, illustrating the above.

All parts are anchylosed. The bones are greatly absorbed, and have evidently been injured in preparation. G. C. 986.

C. Changes from affections of the nervous system.

See No. 6. 17.

D. Changes due to conditions apparently constitutional, but more or less obscure.

See Series 6 under the headings of Rickets & Osteo-Malacia.

III. INFLAMMATORY DISEASES.

1. Where the inflammation is due to the action of pus-forming organisms.
2. Where the inflammation is due to the action of the tubercle bacillus—

i.e.

"Potts' Disease," "Angular Curvature," or "Caries of the Spine."

A. *Tubercular Deposits without altered curvature or loss of substance.*

7. 222. Tubercular Deposits in Several Vertebræ.—Right half of the spinal column, from the sixth dorsal vertebra

to the fourth lumbar vertebra, partly dissected—in spirit, illustrating the above.

The man died after the opening of a psoas-abscess. One was present on either side.

Between the seventh and eighth dorsal vertebræ there has been some absorption and sinking together of the bodies. Between the eleventh and twelfth there is a fibrous-looking nodule. Between the first and second lumbar vertebræ there is an area of caseation softening and absorption, and a similar but smaller area between the second and third lumbar vertebræ.

An abscess is shown on the right side, with its walls laid open. It was found on dissection to communicate by narrow passages with the caseating centres in the lumbar vertebræ.

This specimen teaches the following important points :—(1) That centres of caseation may exist, and give rise to abscesses, without any displacement of the vertebræ; (2) that the communication between such centres and an abscess cavity or cavities may be very small and tortuous, and inaccessible from any wound that could be made during life; (3) that there may be separate centres of tuberculosis in the spinal column, causing displacement at one place and an abscess at another, and that the different centres need not in any way communicate; and (4) that the different centres may be in different phases of advance or subsidence. G. C. 3189.

Presented by J. Shaw M'Laren, F.R.C.S.E., **1890.**

7. 223. Tubercular Deposits in Several Vertebræ.—Part of the eleventh and twelfth dorsal and first four lumbar vertebræ—macerated, to show the effects of tubercular disease in several places.

The upper part of the eleventh dorsal vertebra has been absorbed. Upon the twelfth dorsal vertebra, what seems to be a healed cavity is seen at the front, with new bone formation on either side. The first lumbar vertebra shows one or two partially healed apertures in front, with advancing

destruction on the sides, especially on the right. The second and third lumbar vertebræ are comparatively unchanged, but upon the right side and back of the fourth lumbar vertebra the bone is rarefied and absorbed.

Whatever may have been the state of the column above the eleventh dorsal vertebra, the part below it shows a condition similar to that seen in the last specimen, namely, separate seats of tubercular disease, which have as yet not led to much absorption or alteration in the spinal column as a whole. G. C. 1181.

7. 224. Early Stage of Tubercular Disease.—Two lumbar vertebræ of a child affected evidently by tuberculosis in an early stage, soft parts removed—in spirit.

The following is Sir Charles Bell's description :—

"This is a specimen of the diseased state of the vertebræ, which precedes the destruction of their bodies, and the consequent yielding to the superincumbent weight. There was, in this case, paralysis of the legs, probably in consequence of inflammation of the bone attacking the spinal marrow ; as there is here no compression of the spinal marrow to account for the paralysis, on mechanical principles, we must suppose it is the influence of the contiguous inflammation, and not the curvature of the spine and pressure of the spinal marrow, which produces paralysis."

It is now recognised, as succeeding specimens will show, that paralysis in "Potts' Curvature" is very often, if not invariably, caused by mechanical pressure upon the cord or nerves. B. C. 1. 3. M. 49.

7. 225. Tubercular Disease, causing Abscess, without Displacement.—Last three lumbar vertebræ—partially macerated and in spirit, showing disease between the last two lumbar vertebræ.

The patient, a middle-aged woman, was admitted to the Royal Infirmary, Edinburgh, with a large abscess in the left iliac region. There was no spinal curvature, nor any history of definite pain, pointing to spinal disease, but by exclusion this was considered the most probable cause of the abscess. Owing to the woman's weak state of health, any operation was postponed, and she meanwhile died of rapidly advancing phthisis. At the *post-mortem* examination an abscess was found running along the iliac fascia to the spine, and extending also under the thigh in a line with the psoas muscle.

The intervertebral disc between the last two lumbar vertebræ has been destroyed. The front of the last vertebra is eroded, while some nodules of new bone have been formed on the left side of the fourth vertebra. G. C. 3452.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1892.

7. 226. Tubercular Disease, with Advancing Displacement.—Last dorsal and upper two lumbar vertebræ of a woman who "died of lumbar abscess"—macerated.

The intervertebral cartilages were found softened, and the ligaments loose and spongy, as if macerated by the pus which was round the diseased part. The bodies of the vertebræ have partly been consumed, and one vertebra is seen to be sinking down, and, as it were, dove-tailing itself into the one below. There are numerous spots of rarefaction on the sides of the bodies, and some form apertures, showing necrotic bone within. Some of the ribs on the left side were "diseased a similar way." B. C. 1, 3. M. 50.

B. *Specimens illustrating distinct loss of substance leading to alteration of the curves.*

The plan adopted in arranging the specimens has been as far as possible to illustrate advancing stages of the disease in the various regions of the spinal column, beginning from above downwards.

7. 227. Tubercular Disease, involving Atlas and Axis.—First four cervical vertebræ—macerated, illustrating the above.

The right lateral mass of the atlas, with its articular surface, has been for the most part destroyed, and the exposed bone is

rarefied. The inner aspect of the left lateral mass at the attachment of the transverse ligament is also somewhat rarefied, and the body of the axis and its odontoid process have been diseased, and the substance is light and opened out.

The cause of death is unknown, but this is one of those cases in which there is great danger of a falling forward of the head. This causes death by drawing the medulla against the odontoid process. G. C. 823.

Presented by Sir GEORGE BALLINGALL.

7. 228. Tubercular Disease, with Destruction of Bone.—Upper four cervical vertebræ—macerated, illustrating the above.

The patient, a girl aged sixteen years, had been affected with extensive abscesses in the neck. "She died suddenly after being attacked with difficult breathing and symptoms resembling the common catarrhal fever."

The lateral masses and posterior arch of the atlas are rarefied and partially absorbed, and similar changes are seen in the body, odontoid, and upper articular processes and left half of the ring of the axis, as well as slightly on portions of the third vertebra.

In all probability death has been caused by the pressure of tubercular débris upon the medulla oblongata. G. C. 1075.

Presented by ADAM HUNTER, F.R.C.S.E.

7. 229. Tubercular Disease, with Destruction of Bone.—First five cervical vertebræ—macerated, illustrating the above.

The greater part of the body of the axis has been destroyed, leaving only a bridge of bone, thinner on the left side, between the odontoid process and the lateral masses. There has been some new bone formation on the other vertebræ, and more or less anchylosis has taken place between the second, third, fourth, and fifth vertebræ. The axis has settled down in front upon the third vertebra, so that the head must have projected

forward, and the spine of the axis been rendered prominent. This has probably been a case where an abscess connected with the axis has been opened, and turned septic, and having discharged for some time before death, has led by its irritation to the new bone formation. G. C. 1182.

Presented by Professor JAMES RUSSELL.

7. 230. Tubercular Disease, with Caseous Deposit between the Bone and the Dura Mater.—Axis and four following cervical vertebræ. Spinal canal exposed from behind—in spirit, illustrating the above.

On the right side the articular processes have been somewhat enlarged, and their surfaces are rarefied. Caseous-looking material occupies the intervals between the pedicles, and has formed a thick layer on the outer surface of the dura mater.

This condition is not very common. When such an accumulation increases, it may cause paralysis by pressure upon the spinal cord. It then constitutes the form of "pressure paralysis" in Potts' Disease, which is most amenable to surgical interference. G. C. 3503.

7. 231. Tubercular Disease—Destruction of Bodies—Paraplegia.—Upper three dorsal and lower six cervical vertebræ of a child—macerated, illustrating the above.

"Isabella Rennie, aged ten, died 30th November 1831. She was considered a healthy child till about two years before, when she began to have glandular swellings in different parts of the body. In March a small swelling appeared in the upper part of her back. This gradually enlarged, and at the same time her power of moving her legs diminished. At length she lost this power entirely, and also the sensibility of the whole lower part of the body. She had, however, occasional attacks of convulsions in the legs, which caused much pain. She could not retain her urine, but her bowels had always to be assisted by purgations. She gradually declined in health, was subject to violent catarrhal attacks, and gangrene of the hip from pressure became very deep and extensive. The exterior surface of the joint was thus laid bare.

On dissection, the body was found to be much emaciated. There was serum in both pleuræ, and in the pericardium, but the lungs were healthy. A tumour of the size of an egg projected from the spine into the left pleura. It consisted of a very soft sac, filled with curd-like matter. On examining the spine more minutely, it appeared that the last cervical vertebra was slightly carious, and that the bodies of the three uppermost dorsal vertebræ had been almost wholly absorbed."

Almost the whole of the bodies of the first two dorsal vertebræ have disappeared. The débris of caseous material and bone—removed by maceration—has no doubt been pressed back upon the spinal cord by the weight of the head and neck. The right pedicle and lamina of the first dorsal vertebra have disappeared. Parts of the next two vertebræ on the same side are rarefied. Elsewhere the laminæ, as well as the spines, do not seem to have been affected. G. C. 1288.

Presented by WILLIAM BROWN, F.R.C.S.E.

7. 232. Tubercular Disease, with Destruction of Bodies, Abscess, Paraplegia.—Left half of the lower cervical and upper dorsal vertebræ of a boy—in spirit, illustrating the above.

The patient, aged 12 years, was admitted to the Royal Infirmary, Edinburgh, on 17th October 1892. He had been treated for disease of the spine, with jackets, etc., since the age of four. He was admitted on account of partial paralysis of motion and sensation of the lower limbs, occasional involuntary passage of urine, exaggerated knee-jerk and ankle clonus, but with no fever. There was a marked angular curvature in the cervico-dorsal segment of the spine. Double extension was applied to the head and lower limbs for six weeks without improvement. In December 1892 Professor Annandale removed the laminæ and spines of the seventh cervical and first and second dorsal vertebræ. Pus in abundance, welled up between the dura and the canal, evidently coming from the situation of the bodies in front. The patient, however, died on the same night from respiratory embarrassment and shock.

At the *post-mortem* examination firm adhesions were found at the right apex of the lung, but no tubercular or waxy disease of any of the organs. A large caseous abscess lay in front of the bodies, corresponding to the curvature. The diseased segment was removed, and after being frozen was sawn in sagittal mesial section.

The specimen shows great destruction and absorption of the bodies of the lower cervical vertebræ, with a correspond-

ing falling forward of the upper parts of the canal, so as to drag the spinal cord against a projecting fragment of one of the lower vertebræ. This form of "pressure paralysis" due to spinal disease is not amenable to operative treatment unless indeed the upper part of the column could be replaced. It is sometimes, however, difficult, if not impossible, to recognise it beforehand. G. C. 3481.

Presented by Professor T. ANNANDALE, 1893.

7. 233. Tubercular Disease, with Destruction of the Bodies. — Portions of six dorsal vertebræ of a child — macerated, illustrating the above.

The bodies of three of the vertebræ have disappeared, while those of other two have been partially destroyed. In such a case the caseous matter and débris of bone are apt to be pressed back upon the cord. G. C. 1180.

Presented by Professor JAMES RUSSELL.

7. 234. Tubercular Disease, with Extensive Destruction of the Bodies.—Left half of cervical and dorsal portions of the spine of a child—partially macerated and dried, illustrating the above.

The bodies of the vertebræ from the lower cervical to the tenth dorsal inclusive have been almost entirely destroyed. The spine has consequently been bent upon itself so much that the lower cervical vertebræ must have been close down upon the eleventh dorsal. The spinal canal has evidently been almost obliterated, and extensive paraplegia must have been the consequence. B. C. 1. 3. M. 57.

7. 235. Tubercular Disease, with Destruction of the Bodies.—Lower four cervical and upper ten dorsal vertebræ of a child—macerated, illustrating the above.

The bodies of the last cervical and first six dorsal vertebræ have been destroyed, and have disappeared. The spine has thus been so bent upon itself that the head of the first rib is close to that of the sixth, and the bodies of the sixth cervical and sixth dorsal vertebræ nearly touch. The spine of the third dorsal vertebra is greatly atrophied, and there is a distinct space between its laminæ and those of the vertebræ above and below it. Some of the articular processes seem to be anchylosed. This must have been a case of paraplegia, and probably also of abscess. G. C. 596. a.

7. 236. Tubercular Disease, with Destruction of the Bodies.—Portion of a dorsal and lumbar spine—in spirit, showing extensive destruction of the bodies of two of the lower dorsal vertebræ.

Some of the débris of the affected vertebræ seems to have been crushed backwards upon the spinal cord, and no doubt compressed it. The bodies of the adjacent vertebræ have been eroded on the surface, and opaque patches of caseation can be seen here and there in their interior, although there has not been much alteration of their general shape. Part of the wall of an abscess cavity is shown attached to the sides of all the bodies in the preparation. It seems to have opened backwards past the transverse processes, as well as communicated with the canal at the place where the bodies have disappeared.

B. C. 1. 3. M. 52.

7. 237. Tubercular Disease, with Destruction of the Bodies —Paraplegia.—Lower cervical and dorsal spine, apparently of a young person—in spirit, showing great destruction of the bodies in the mid-dorsal region.

"The vertebræ of the back carious, seen as they appear in a fresh state. The bodies of several have been completely destroyed, and their places filled up with a curdy scrophulous matter contained in a thick

cyst, a considerable quantity of which is still seen adhering to the boundaries of the cavity, particularly to the outside of the dura matral covering of the spinal marrow. This matter had pressed on the spinal marrow so as to produce paralysis of the lower extremities. A very excellent preparation, as illustrative of the effects of this disease (1804)."

W. C. H. 54.

7. 238. Tubercular Disease, with Destruction of Bodies —Paraplegia.—Right half of the lower dorsal and upper lumbar portions of the spine—in spirit, illustrating the above.

The patient had suffered from spinal disease, with paraplegia, for some years, and died of phthisis in the Hospital for Incurables. At the *post-mortem* examination a large abscess was found surrounding the bodies of the affected vertebræ. This abscess contained, besides curdy pus, several loose fragments of hard necrosed bone, which had been driven back, by the pressure of the adjacent vertebræ, upon the spinal canal.

These fragments, found at the *post-mortem* examination, are shown *in situ*, having been embedded in dark paraffin before the section was made, in order that their relative position might be maintained.

It may be noted that the curvature, which corresponds to what existed at the time of death, is comparatively slight. This is important as showing that a minor degree of curvature may co-exist with involvement of the spinal cord.

G. C. 3475.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

7. 239. Tuberculosis, with Destruction of Bodies—Atrophy of Ribs and Spines, and Paraplegia.—Right half of a spine representing the lower seven dorsal vertebræ (sixth to twelfth inclusive), with portions of the lower seven ribs attached. Soft parts partially dissected—in spirit, illustrating the above.

The patient, a young man aged 20, about two years before admission to the Royal Infirmary, Edinburgh, first noticed a pain in the lower dorsal region of his spine, when he stooped or straightened his back. The pain was dull and aching, and extended along the ribs on the left side, which corresponded to the painful part of the spine. It gradually increased, and in about six months had become constant,

whether he was sitting or standing. A month later it had extended along the ribs on the right side. These symptoms gradually increased until December 1888, when he was admitted into the Infirmary. At that time he had no pain or weakness in his legs, and as soon as a Plaster-of-Paris jacket had been applied he returned home. The pain in his spine was not relieved, but that in his ribs disappeared. Soon, however, he felt a loss of sensation in his legs, beginning first in the left thigh, and extending to other parts of the lower limbs. About a month after the jacket had been applied, the pain in the back increased, and he had difficulty in walking. On January 10th, 1889, he returned to Mr Miller's ward, and was then able to walk into the waiting room with the aid of an umbrella. His legs were weak, and the pain in his back worse, and at his own request the jacket was removed, He made an effort to get up, but found that he had entirely lost the power of his legs, and so had to be carried from the waiting room to the ward. After ten days he was taken to the Medical House. At that time a projection of the tenth, eleventh, and twelfth dorsal spines was noted, and both lower limbs were completely paralysed. The plantar reflex was present on the left side, but not on the right. Ankle clonus was obtained on both sides, and also patellar reflex, but not exaggerated. No cremasteric reflex was obtained, but the anterior abdominal and thoracic reflexes were lively. The patient could tell when his bladder was full, but had difficulty in starting micturition. His bowels sometimes moved without his knowledge. The muscles of the paralysed limbs were firm and not wasted. No trophic lesion was visible. There was a constant dull pain in his back near the prominence, with occasional sharp pains, followed by drawing up of his legs. The pain was sometimes felt when he moved his trunk. When he coughed there were occasional sharp pains following the line of the ribs attached to the diseased portion of the spine. Over the eighth dorsal spine even a light pressure caused pain. There was no marked tenderness over the tenth, eleventh, and twelfth dorsal spines. The other systems were normal. On May 4th the sensation was perfect in both feet, and the area of insensitive skin less. He could flex his knees occasionally, and had better control over his rectum and bladder than formerly.

The spine was trephined on May 31st by Mr Miller. After removing the soft parts, the tenth dorsal spine, which was softened and inflamed, was removed with bone pliers. The spinous process above it was next looked for, but was absent, and the corresponding lamina was atrophied to the thickness of ordinary letter paper, and could easily be broken with the finger nail. The dura mater was opened, and much cerebro-spinal fluid welled out. Excepting that the spinal cord was thinner and smaller than normal, nothing wrong was detected. The wound was then closed. Shortly after the operation, symptoms of spinal meningitis appeared, but by July 4th they were rapidly disappearing.

It was noted on August 5th for the first time that at each inspiration there was a sinking in of the wall of the chest near the affected part of the column. On palpation, the vertebral ends of the tenth

and eleventh ribs were found wanting for a distance of from two inches to two and three-quarter inches from the middle line. At the same time, the patient could localise the touch of a finger or the point of a pin all over the back and lower extremities, being in this respect much better than before. On October 7th it was noted that the disappearance of the ribs was progressing. On October 11th Mr Miller cut down upon the affected ribs on the right side to discover the cause, if possible, of the atrophy. The ribs when traced, he observed, became suddenly rough and nodular, and smaller in bulk. Portions were removed, placed in absolute alcohol, and sent to Drs Woodhead and Bruce for examination. The wound turned septic, and on October 23rd secondary hæmorrhage occurred, and despite all efforts to stop it, returned repeatedly, until the patient died on November 10th from exhaustion.

The specimen shows many points of great interest. The lower part of the body of the eighth, the whole of the ninth, and the upper part of that of the tenth dorsal vertebræ are wanting, and a bridge of new bone unites the eighth and tenth dorsal bodies in front, preventing the one from sinking down upon the other.

The spinous processes seen in the preparation are those of the sixth, eighth, eleventh, and twelfth dorsal vertebræ. The spinous process of the seventh vertebra has practically disappeared, so that the projection below the sixth is really the remains of the eighth spine. The ninth spine was wanting when the spine was trefined, and what remained of the tenth spine was then removed. The great part of the lamina of the tenth dorsal vertebra has also disappeared.

The vertebral ends of the ninth and tenth ribs are also wanting.

The intervertebral foramen for the eighth dorsal nerve has been displaced backwards, so that the nerve emerges below the lamina near the spine. The ninth nerve crosses the space in which no bone is present at all, and the tenth nerve comes through a small aperture in what seems to be the remains of the tenth lamina.

The remains of the soft parts in the neighbourhood of the diseased portion are covered by recent lymph and discoloured blood-clot, the result of the abscess following the second operation.

The cause of the absorption of the laminæ is still obscure. A possible clue may be found in the pressure which must have been present at one time upon the intervertebral nerves. The portion examined by Dr. Woodhead was found to show no sign of tubercular disease. G. C. 3105.

Presented by A. G. Miller, F.R.C.S.E., **1889.**

7. 240. Tuberculosis, with Atrophy of Ribs and Spines, and Paraplegia.—Left half of the previous specimen—in spirit, illustrating the above.

Atrophy of the vertebral ends of the ninth, tenth, and eleventh ribs is well shown. The pleura is greatly thickened and adherent, and the remains of the cavity similar to that on the other side is seen. G. C. 3106.

Presented by A. G. Miller, F.R.C.S.E., **1889.**

7. 241. Tubercular Disease, with Destruction of Bodies.—Lower cervical, dorsal, and lumbar portion of the spine of a child, with ribs attached—partly macerated, illustrating the above.

There has been extensive destruction of the bodies of the last two dorsal and first lumbar vertebræ. The front of the vertebræ that remain from the fourth dorsal to the second lumbar inclusive have evidently been bared of periosteum and ligament, and their surfaces are rarefied and eroded. The spine is acutely bent where the vertebræ have been destroyed, so that the body of the eleventh dorsal touches that of the first lumbar. B. C. 1. 3. M. 60.

7. 242. Tubercular Disease, with Destruction of the Bodies.—Lumbar vertebræ of a child—in spirit, illustrating the above.

"From a child affected with lumbar abscess, which projected, and was evacuated at the groin."

The specimen shows loss of substance of the fourth, and part of the fifth vertebræ, and some disease of the second.

The destruction of the bodies has left the spinal canal completely exposed from the front. G. C. 725.

Presented by ALEX. WATSON, F.R.C.S.E.

7. 243. Tubercular Disease, with great Destruction of the Bodies.—Left half of a spinal column, pelvis, and part of skull —partially cleaned and dried, illustrating the above.

Margaret M'N., about thirty, was known by the inspector of poor for about ten years as a prostitute of the very lowest type. Some deformity was supposed to have been present since childhood, and she had gone about "doubled-up" certainly for ten years before death. She went into the workhouse in an exhausted condition, and died there from increase of the exhaustion, without symptom of any definite disease, probably the result of a debauched life and ill health. She was able, however, to "move about" until a month or two before her death. There had been a sinus discharging for some time, beside the projecting spines. On each side a chronic abscess was found extending about half-way to the groin, and filled with caseous material, becoming calcareous.

The bodies of the vertebræ from the ninth dorsal to the second lumbar inclusive, as well as portions of those of the seventh and eighth dorsal and third lumbar, have disappeared. The corresponding spinous processes have been fused into a single piece, which has been accidentally broken after death. The dorsal spine above the disease has been curved forwards, *i.e.* with the convexity towards the thorax, and in consequence the ribs from the fourth to the tenth have been curved markedly upwards and forced together. There is considerable calcareous débris now in some parts of the canal, but this must have been loose during life, and probably has not pressed against the nerves. The narrowing of the outlet of the pelvis, and the tilting back of the promontory of the sacrum, are characteristic of Kyphosis.

The absence of paraplegia is remarkable, and is probably to be explained by the gradual escape of the débris through the sinus and the slow formation of the curves. G. C. 3244.

Presented by JOHNSON SYMINGTON, F.R.C.S.E., 1891.

7. 244. Tubercular Disease, with Destruction of the Bodies.—Right half of the previous specimen, similarly prepared.

The piece of bone representing the fused spines is well shown. G. C. 3244.

Presented by JOHNSON SYMINGTON, F.R.C.S.E., **1891.**

c. Specimens illustrating spontaneous cure, more or less complete.

7. 245. Tubercular Disease, partially cured by Anchylosis.—Four lower dorsal and two upper lumbar vertebræ—macerated, illustrating the above.

The spine is bent forward, and the tenth, eleventh, and twelfth dorsal bodies are anchylosed into a common mass. This mass has been in turn attacked, and its surface shows large rounded depressions and excavations. The body of the first lumbar vertebra, and slightly also that of the second, is similarly eroded. The articular processes are all more or less anchylosed. B. C. 1. 3. M. 53.

7. 246. Tubercular Disease, partially cured by Anchylosis.—Last cervical, dorsal, and upper three lumbar vertebræ—macerated.

"A great abscess covered these bones, and the patient died of hectic as it appeared."

"Some of the vertebræ are united together by bone, a small part of the third vertebra remains, the sixth and seventh are much destroyed, the ninth and tenth also, and the heads of the ribs have partaken of the disease, some of them being carious, others united together."

The spine is uniformly bent forward. A bridge of bone unites partially the eleventh and twelfth dorsal, also the twelfth dorsal and first lumbar vertebræ. The anchylosis represents an attempt at cure. B. C. 1. 3. M. 51.

7. 247. Tubercular Disease in Process of Cure.—Upper ten dorsal vertebræ—macerated, illustrating the above.

The bodies from the third to the eighth vertebræ have been affected. The inter-vertebral foramina just at the bend have been obliterated by the pressure of débris into them. The laminæ of the affected vertebræ are ossified together, and the fourth and fifth spinous processes and laminæ are greatly atrophied.

The coincidence of the blocking of the inter-vertebral foramina with the atrophy of the spinous process should be noted in connection with No. 7. 238; but whether there is any relation between them, as cause and effect is uncertain.

W. C. H. 53.

7. 248. Tubercular Disease in Process of Cure.—Right half of the spinal column, thorax, and pelvis of a child—macerated, illustrating the above.

There is an acute curvature in the lower dorsal region, and the lower six vertebræ are fused into a common wedge-shaped mass, with its apex projecting backwards. There are cavities in its interior. The spinous processes at the angle are somewhat atrophied, and thus the apparent acuteness of the curve is diminished.

B. C. I. 3. M. 10.

7. 249. Tubercular Disease cured by Anchylosis.—Spinal column, thorax, and pelvis of a young person—macerated, illustrating the above.

"This is a fine example of the curve, which is the consequence of caries and anchylosis. The œsophagus reached directly from the neck to the diaphragm, so that it was not more than three inches in length, while the aorta measured between the same points nearly nine inches."

The bodies of the vertebræ from the seventh dorsal to the second lumbar inclusive have been greatly absorbed, and their remains fused into a common mass, in which the seventh dorsal vertebra above touches the second lumbar below. The spinous processes at the projecting angle are somewhat absorbed. The upper portion of the dorsal spine has a compensating

convexity forwards, and the ribs in consequence have been canted upwards. The pelvis shows the usual kyphotic changes, *i.e.* a tilting backwards of the upper end of the sacrum and a tilting forwards of its lower end. B. C. I. 3. M. 68.

7. 250. Tubercular Disease cured by Anchylosis.—Plaster of Paris cast from the body from which the foregoing specimen was taken—illustrating the shape of the trunk in such cases.

B. C. I. 3. M. 69.

7. 251. Tubercular Disease cured by Anchylosis.—Two macerated lumbar vertebræ partially absorbed and anchylosed, from previous tubercular disease. W. C. H. 75.

7. 252. Tubercular Disease cured by Anchylosis.—Section of the bodies of six lower dorsal vertebræ—macerated, illustrating the above.

There is firm osseous anchylosis of the bodies of the eighth, ninth, and tenth, and of the laminæ of the seventh, eighth, ninth, and tenth, vertebræ. The remains of intervertebral discs can still be seen within the more or less perfectly formed cancellous tissue, forming the fused mass. This specimen shows "how perfectly the canal for the spinal marrow may retain its form, although the bodies of the vertebræ have been destroyed, and anchylosis has taken place."

B. C. I. 3. M. 62.

7. 253. Tubercular Disease cured by Anchylosis.—Right half of the last cervical and first eleven dorsal vertebræ, with the articular ends of the corresponding ribs—macerated.

The preparation shows complete anchylosis of the last

cervical and upper nine dorsal vertebræ. The fused bodies form a single piece of cancellous bone, which is bent acutely upon itself. Opposite the centre of the bend there is a trace of some of the intervertebral discs. Above and below that, however, the fusion is so perfect as to show no trace of the original separate bodies. The two unchanged vertebræ occupy a space nearly equal in length to that of the ten fused vertebræ above it. The intervertebral foraminæ on the fused portion are quite distinct, but the intervals between them have been greatly reduced. The laminæ of the fused vertebræ are likewise welded into a common piece. G. C. 3482.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

7. 254. Tubercular Disease cured by Anchylosis.—Skeleton from a subject about 14 years of age—macerated, and divided by a mesial section, illustrating the above.

The specimen shows the effects of tubercular disease which involved the whole of the dorsal vertebræ, except the first and the last. The bodies have fallen together, and the lower eight affected ones are anchylosed into a wedge-shaped mass of cancellous tissue, with its apex projecting backwards. The upper two affected vertebræ are anchylosed to one another, but not to the lower mass. The spinal canal is diminished slightly at the bend, but less so than would at first appear, because the section just at the bend is not quite mesial. To compensate for the marked backward projection in the upper dorsal region, the normal forward curves in the cervical and lumbar regions are greatly increased, so that the head still remains over the pelvis and the face looks upwards. The ribs are, as usual, greatly compressed, and the cavity of the thorax diminished. The pelvis is kyphotic, and the bones generally are very light.

W. C. H. 71.

7. 255. Tubercular Disease cured by Anchylosis.—Skeleton

of a young person—macerated, and divided by a mesial section, showing the effect of tubercular disease in the lower dorsal and lumbar regions.

The vertebræ affected are the last three dorsal and first three lumbar, which are now fused into an irregular mass. The spine is bent acutely forward in the upper dorsal region, but the spinal canal has not been appreciably encroached upon, at least by bony matter. The portion of spine above the disease, and what remains of it below the disease, has been curved with the convexity forwards, thus exaggerating the normal curves in the cervical and lumbar regions. By these compensating curves the skull remains over the pelvis, and the face looks forwards. The ribs are greatly compressed, and the cavity of the thorax is diminished.

The pelvis is kyphotic, and the angle between the neck of the femur and the shaft is very obtuse.

B. C. 1. 3. M. 64. and 65.

7. 256. Tubercular Disease leading to Abscess.—Wax-covered plaster cast of tubercular disease of the spine, with lumbar abscess. B. C. 1. 3. M. 55.

3. Where the inflammation is due to the poison of Syphilis.

7. 257. Syphilitic Softening of Transverse Ligament of the Atlas—Dislocation—Death.—Anterior portions of the upper three cervical vertebræ, partly dissected—in spirit, illustrating the above.

"From a patient in the Lock Hospital, who had venereal sore-throat, and the ulceration extended to the spine. The atlas, falling forwards, carried the spinal marrow against the tooth-like process, and crushed it. He died in an instant. See the Hospital Reports, pages 149, 469, and the Exposition (Bell) of the Nervous System, page 234." The softened remains of the transverse ligament is shown on the right side.

B. C. 1. 4. M. 2.

4. Arthritis Deformans affecting the spine.

7. 258. Arthritis Deformans, causing Anchylosis.—Last four dorsal vertebræ—macerated, illustrating the above.

There is considerable irregularity of the front of the bodies, and an outgrowth of bone at their upper and lower margins, especially on the sides, where in several places the overgrown margins have met, and bridged over the interverte bral discs. B. C. 1. 3. M. 73.

7. 259. Arthritis Deformans, with Anchylosis and a Forward Bend.—Cervical, dorsal, and lumbar portions of a spine—partially macerated and dried, illustrating the above.

The spine, as a whole, is bent forward. There has been irregular outgrowth at the margins of the bodies, and in many places they have been united by arches of bone, thrown across the intervertebral discs. This is especially noticeable on the right side of the dorsal region. On the left side the heads of the seventh and eighth ribs are fused to the bodies of the vertebræ with which they articulate. B. C. 1. 3. M. 9.

Figured by Shaw "on Distortion," plate i. fig. 5.

7. 260. Arthritis Deformans, with Anchylosis and Lateral Curvature.—Left half of a pelvis, with lumbar and lower three dorsal vertebræ—macerated, illustrating the above.

The front of the sacro-iliac sychondrosis is ossified. There is considerable bony outgrowth at the margins of the intervertebral discs, but a special outgrowth of bone formed on the left side of the lumbar bodies has completely united them. The bones all over are somewhat irregular, and the muscular and tendinous impressions are unusually prominent. There has been a slight amount of lateral curvature. B. C. 1. 3. M. 7.

Figured by Shaw "on Distortion," plate i. fig. 4.

7. 261. Arthritis Deformans, with Anchylosis.—Five lower dorsal and three upper lumbar vertebræ—macerated, illustrating the above.

The usual irregularity at the intervertebral margins is seen, and large masses of bone have been thrown out along the right side, where they completely unite the bodies.

B. C. I. 3. M. 73.

7. 262. Arthritis Deformans, with Anchylosis.—Two dorsal vertebræ—macerated, illustrating the above.

The bodies of the vertebræ are completely united on the right side by a newly formed bridge of bone. G. C. 996.

7. 263. Arthritis Deformans, with Anchylosis.—Two lumbar vertebræ—macerated, illustrating the above.

The bodies, articular processes, and spines are firmly anchylosed. F. P. C. 807.

Presented by Professor JOHN THOMSON.

7. 264. Arthritis Deformans, with Anchylosis.—Two cervical vertebræ—macerated, illustrating the above.

The bodies, left articular processes, and laminæ are fused together. F. P. C. 327.

Presented by Professor JOHN THOMSON.

7. 265. Arthritis Deformans, with Anchylosis.—Portion of a sacrum with the lumbar and lower dorsal vertebræ—macerated, illustrating the above.

The lumbar part, with what remains of the dorsal of the spine, is bent forward. The spines, laminæ, and articular processes are completely fused throughout, and the upper three bodies

are fused at their anterior margins. The lower vertebræ are greatly broken, and there are large spaces in the position of the intervertebral discs. This is probably an instance of arthritis deformans, with *post-mortem* injury of the bone.

W. C. H. 50.

IV. NEW GROWTH AFFECTING THE SPINE.

7. 266. Sarcoma affecting the Spine.—Section of the lumbar portion of the spine of a young person—in spirit, illustrating the above.

William A., a weakly-looking boy, aged 10 years, was admitted to Ward 10 in December 1892 under the care of Mr Duncan, complaining of loss of power in both lower extremities. His lower limbs were almost entirely paralysed, but he could turn himself on to his face. Sensation in his legs was dulled, but not entirely lost; he could localise touches with the fingers, but could not say with how many fingers he was touched. A rounded swelling apparently connected with the bone could be felt over the head and upper part of the left fibula. There was a slight deformity of the spine in the lower dorsal and upper lumbar regions. Patient showed great tendency to the formation of bedsores, and required constant change of position. His feet became very œdematous, and large blebs formed on them, which were prevented from breaking by the application of wool and collodion. His prepuce was also very œdematous, and rendered the passage of a catheter difficult.

The patient had been sent into the Infirmary as a case of Potts' disease. From the anomalous character of some of the symptoms, this diagnosis was considered doubtful, but a plaster jacket was applied, and he was kept in bed.

Not long afterwards, however, the jacket had to be removed on account of a swelling of his abdomen. Towards the end of December he had retention of urine, and this was shortly followed by incontinence of both urine and fæces. About the beginning of January a hard swelling appeared above the pubes, and rapidly increased in size. On 10th January there was ptosis of the left eyelid, and shortly after that ptosis of the right also, with internal strabismus as well. The patient got gradually weaker, and died on 24th January, having suffered very little pain from first to last.

At the *post-mortem* examination, within the thorax there was found a large tumour about the size of a hen's egg in the upper dorsal region, and also a "warty" tumour all along the right side of the vertebral column. A tumour was present on the posterior surface of the right lung.

There was a large growth in front of the pelvis reaching to one and a half inches from the umbilicus. The growth was chiefly on the left side, and had most likely proceeded from another tumour on the left iliac bone. The whole pelvis was a mass of soft tumour.

The ureter on the left side was greatly dilated.

The dura mater was extremely adherent to the skull cap. In the posterior part of the superior longitudinal sinus there was a small pale tumour. Also on the left side, near the middle line, there was another tumour under the dura mater. The convolutions were somewhat pale. Vessels at base of brain were normal. The brain substance was extremely anæmic, and somewhat œdematous.

From the second to sixth dorsal vertebræ the cord was decidedly thinner (*sic*). It was quite firm in its whole extent, except at the upper part of the lumbar enlargement.

The section shows the tumour to be composed of soft material, arranged in lobulated portions of slightly different colour and consistence, which are separated by a very delicate connective tissue. The part most affected is the periosteum. There is apparently neither ossification nor invasion of bone.

It was not possible to say where the primary tumour had been situated in this case. G. C. 3491.

Presented by JOHN DUNCAN, F.R.C.S.E., 1893.

DIVISION II. MUSCLES AND TENDONS, SYNOVIAL SHEATHS, BURSÆ, FASCIÆ, AND CONNECTIVE TISSUE.

SERIES VIII. STRUCTURE AND ARRANGEMENT OF MUSCLES AND TENDONS, SYNOVIAL SHEATHS, BURSÆ, FASCIÆ, AND CONNECTIVE TISSUE.

8. 1. Muscular Fibres.—"A packet of muscular fibres, from a piece of salt beef, which had been boiled"—in spirit.

B. C. IV. 1. N. 1.

8. 2. Relative Vascularity of Muscle and Tendon.—Part of a gastro-cnemius muscle and tendo-Achillis, injected with vermilion, dried, and mounted in turpentine to illustrate the above.

The difference between the two in colour, and hence in vascularity, is very striking. B. C. IV. 1. N. 2.

8. 3. Arrangement of Muscular Fibres.—Rectus femoris muscle of "a child twelve months old"—dissected, and in spirit, to illustrate a penniform arrangement of the muscular fibres.

B. C. IV. 1. N. 3.

8. 4. Arrangement of Muscular Fibres. — Injected right

scapula, humerus, and clavicle, with the deltoid muscle of a child, dissected as a specimen of "a radiated muscle"—in spirit, firm. B. C. IV. 1. N. 5.

8. 5. Relation of Muscle and Tendon.—Bones of an injected right leg and portion of tarsus, with the anterior and posterior tibialis muscles from "a child before birth"—dissected, and in spirit, to illustrate the above. B. C. IV. 1. N. 4.

8. 6. Relation of Muscle and Tendon.—Injected left scapula and part of radius, with the biceps muscle of a child—dissected, and in spirit, to illustrate a two-headed muscle. B. C. IV. 1. N. 6.

8. 7. Relation of Muscle and Tendon.—Injected left scapula, humerus, and upper end of ulna with the triceps muscle—of a child—dissected, and in spirit, to illustrate a three-headed muscle. B. C. IV. 1. N. 7.

8. 8. Relation of Muscle and Tendon.—Injected lower end of right femur and os calcis, with the gastro-cnemius and soleus muscles of a child—dissected, and in spirit, to illustrate "a quadriceps muscle." B. C. IV. 1. N. 8.

8. 9. Structure of Tendon.—A tendo-Achillis from an injected leg — in spirit, illustrating its component bundles, and the vascularity of its sheath. B. C. IV. 1. N. 12.

8. 10. Tendon Sheath.—An injected finger dissected, and in spirit, to show the strong sheath which binds the flexor tendons to the phalanges. B. C. IV. 1. N. 9.

8. 11. Arrangement of Tendon within Sheath.—An injected finger, dissected and in spirit, to illustrate the splitting of the flexor sublimis digitorum for the passage of the flexor profundus, and the reflections of the vascular synovial lining of the sheath upon the relatively non-vascular tendons.

B. C. IV. 1. N. 10.

SERIES IX. INJURIES AND DISEASES OF MUSCLES AND TENDONS, SYNOVIAL SHEATHS, BURSÆ, AND FASCIÆ AND CONNECTIVE TISSUE.

MUSCLES AND TENDONS.

1. *Injuries.*

9. 1. Injury to Tendons.—Thumb and long flexor tendon—in spirit, illustrating the result of evulsion.

The parts were torn off by being entangled in machinery.

The specimen illustrates what has been often observed when fingers are torn off, viz. that the part which gives way is the attachment between the muscle and the tendon, rather than the tendon itself. B. C. 4. 1. M. 5.

2. *Diseases.*

I. Abnormalities in Growth or Development.

Specimens wanted.

II. Changes produced by Conditions affecting the Nutrition and Growth of Muscle and Tendon.

A. Changes from Local Conditions affecting the Nutrition and Growth of Muscles and Tendons. For Disease, see Series 1.

B. Changes from affections of the Nervous System.

9. 2. Atrophy of Muscle from Paralysis.—Humerus, part of scapula, and upper end of radius and ulna, with some of the muscles attached—in spirit, from a paralytic patient.

The biceps muscle is reduced to a thin fibrous cord, and its tendons are correspondingly small. The coraco-brachialis,

supra-spinatus, infra-spinatus, and sub-scapularius muscles seem completely degenerated into fibrous and fatty tissue, the triceps, however, being still fairly well developed, and presenting in colour and arrangement a striking contrast to the others.

B. C. 4. 1. M. 1.

9. 3. Atrophy of Muscle from Paralysis.—Portion of the soleus muscle—in spirit, illustrating the above.

The muscle has apparently been transformed completely into fat and fibrous tissue. The tendon, however, retains more of its natural appearance. B. C. 4. 1. M. 2.

C. Changes from Constitutional or other Conditions more or less obscure.

9. 4. Rider's Bone.—Anterior portion of a man's pelvis—dissected, and painted over with glycerine and corrosive sublimate, to illustrate the above.

On both sides a strong spur of bone about half an inch in diameter and about two inches long projects from the front of the symphysis pubis just below the crest, and follows the direction of the adductor longus muscle. On the right side the muscles have been dissected off, and the bone on this side has been separated from the pelvis by a fibrous intersection which has been wrenched open. The mode of union is thus seen to have been an irregular form of synchondrosis. On the left side the origins of the muscles have been left, and it can be seen that besides the adductor longus, the greater part of the adductor brevis, and portions of the pectineus, the gracilis, and the obturator externus take origin from the new spur of bone.

G. C. 3455.

Presented by Professor JOHN STRUTHERS, **1893.**

9. 5. Degeneration of the Diaphragm.—Portion of a dia-

phragm, formerly described as "a peculiar condensed state of the diaphragm"—in spirit.

The condition seems to be one of great thickening—possibly tubercular—on the peritoneal aspect of the diaphragm, while the muscular fibre seems pale and firm. Possibly the peritoneal thickening may have interfered with the movements of the muscle, and so led to its degeneration. G. C. 611.

Presented by Professor JOHN THOMSON.

9. 6. Degeneration of Muscles of Arm.—Transverse section of a forearm—in spirit, illustrating the above.

"The integuments were indurated and tuberculated from the middle of the arm to that of the forearm, and the elbow and muscles of the forearm rigid. The hand and lower part of the extremity were much swollen and œdematous. On the forearm was a considerable ulcer, with abrupt ragged edges and foul surface.

"The arm was amputated close to the shoulder joint, where the parts appear sound, but after some months a similar disease attacked the cicatrix of the stump, and gradually extended till the patient died."

"The section exhibits the skin much thickened and having the appearance of scirrhus; the muscles appear for the most part converted into a white substance like cartilage, retaining to a certain degree the fibrous form of muscle; in other parts the muscle is seen pale, as if gradually passing into the cartilaginous state. The adipose and cellular membrane have disappeared, so that the muscles appear to be matted to each other, and to the diseased skin. The larger nerves and blood-vessels are seen passing through the parts unchanged."

This *may* have been a general tuberculosis of the skin, with degeneration of muscle following disuse.

G. C. 221.

Presented by W. NEWBIGGING, F.R.C.S.E., and Professor J. W. TURNER.

III. INFLAMMATORY DISEASES.

9. 7. Abscess in Muscle.—Portion of a muscle, possibly rectus femoris—in spirit, illustrating the above.

Within the muscle there is a large cavity, with a definite wall, which has a somewhat flocculent lining. This has probably been a tubercular abscess. B. C. 4. I. M. 4.

IV. New Growths.

Specimens Wanted.

Synovial Sheaths.

(*Injuries.*)

Diseases.

I. Abnormalities and II. Changes due to Alterations in Nutrition and Growth.

Specimens wanted.

III. Inflammatory Diseases.

Inflammation due, 1 *to mechanical injury, or* 2 *to pus-forming organisms.*

Specimens wanted.

3. *Inflammation due to the Tubercle Bacillus.*

9. 8. Tubercular Affection of Synovial Sheath, "Compound Ganglion."—Cast in gelatine and glycerine of the front of a left wrist of a woman, illustrating the above.

"Mrs. W., aged 41, was admitted to the Royal Infirmary, Edinburgh, in January 1891, complaining of pain and swelling in the palm of the left hand and wrist. Two years ago there appeared a swelling on the front of the wrist, unattended with pain, except under strong exertion. This remained unchanged until five weeks ago, when a swelling on the palm of the hand appeared also. The fingers became stiffer, and now she cannot grasp anything. Three years ago her foot was amputated for tubercular disease of the ankle. No other history of tubercle. Her family history is good. Incisions were made in the wrist and palm, and gelatinous and melon seed-like bodies scraped out."

There is a distinct swelling of the front of the wrist and adjacent part of the palm, with a slight constriction opposite the position of the anterior annular ligament. G. C. 3371.

Presented by Charles W. Cathcart, F.R.C.S.E., 1892.

9. 9. "Melon Seed" Bodies from Tubercular Affection of Synovial Sheath, "Compound Ganglion."—Numerous "melon-seed" bodies—in spirit.

From a ganglion over the tendon of the extensor communis digitorum muscle.

These bodies, often found in enlarged and thickened synovial sheaths, have been proved to be associated with the tubercle bacillus. B. C. II. M. 36.

9. 10. "Melon Seed" Bodies from Tubercular Affection of Synovial Sheath, "Compound Ganglion."—Numerous melon-seed bodies—in spirit.

"These were evacuated by incision from the sheath of the flexor tendons of the middle finger. The patient, a man over 50 years of age, had suffered from this enlargement for six or seven years. Incision was made nearly over the heads of the metacarpal bones. The patient, at first, was greatly relieved."

Besides well-formed loose bodies, others were found smaller, and in process of formation, showing the gradual development as enlargements from the inner surface of the synovial sheath, often in the form of fringes. G. C. 852.

Presented by JOHN GAIRDNER, F.R.C.S.E., **1826.**

9. 11. Large Ganglion near the Wrist.—Plaster of Paris cast of the back of a left hand and wrist, showing an enlargement near the lower end of the ulna.

The cast was originally entered as one of a diseased bursa, but from its lobulated character and position over the region of the synovial sheaths at the lower end of the ulna, it has no doubt been a ganglion, possibly associated with arthritis deformans. F. P. C. 2933.

9. 12. Very Large Ganglion near the Wrist.—Plaster of Paris cast of the back of a right hand and wrist, illustrating the above.

The chief swelling is over the lower end of the radius, but there is also a smaller swelling over the head of the ulna.

The main swelling is markedly lobulated, and at some places rises into nobs. This was formerly described as a diseased bursa, but the cast itself has the word "exostosis" written upon it. Probably, however, it was a ganglion, associated with arthritis deformans, and so tense that it felt like bone. F. P. C. 2933.

Bursæ.

(*Injuries.*)

Diseases.

I. Abnormalities in Growth and Development.

II. Changes produced by Alterations in Nutrition and Growth.

9. 13. Great Enlargement and Distension of the Bursa Patellæ.—A large sac, with a portion of the skin and underlying soft parts, dissected from the front and outer side of a knee—in spirit.

The patient, a woman aged 50, had been aware of the swelling for nineteen years.

The main sac is lined by a somewhat flocculent membrane. Behind the sac there was a considerable thickening, composed of fibrous tissue, enclosing soft, friable material.

This is a form of chronic enlargement of the bursa, the nature of which is obscure. G. C. 2751.

Presented by A. G. Miller, F.R.C.S.E., **1885.**

9. 14. Great Enlargement and Distension of the Bursa Patellæ.—Plaster of Paris cast of the previous specimen.

Its circumference before removal was $16\frac{1}{2}$ inches.

The cast shows the lobulated character of the growth, and its prominence on the front and outer side of the joint.

G. C. 2751 A.

Presented by A. G. Miller, F.R.C.S.E., **1885.**

III. Inflammatory Diseases.

1. *Where the inflammation has been due to mechanical injury.*

9. 15. Simple Chronic Inflammation of the Bursa Patellæ.—"Housemaid's-knee." Patella and ligamentum patellæ, with thickened bursæ over it—laid open, in spirit.

The walls are thickened, and are apparently lined with lymph, in process of organisation. B. C. 2. M. 23.

2. *Where the inflammation has been due to action of pus-forming organisms.*

Specimens wanted.

3. *Where the inflammation is due to the action of the tubercle bacillus.*

9. 16. Enlargement of Bursa Patellæ, probably Tubercular.—Enlarged and somewhat thickened bursa patellæ, with attached portion of the skin, from the knee of a young woman—in spirit.

The patient had suffered from an obstinate form of housemaid's knee for some years. As the condition was suspected to be tubercular, Mr Cathcart excised the whole bursa, and the patient made a good recovery.

The inner lining has numerous wart-like bodies growing from it. G. C. 3263.

Presented by Charles W. Cathcart, F.R.C.S.E., 1891.

9. 17. Tubercular Enlargement of the Bursa Patellæ.—Sections of the right and left bursa patellæ of a woman, showing thickening and distension of the wall—in spirit.

Mrs M., aged 38 years, was admitted to the Royal Infirmary, Edinburgh, in May 1892, complaining of a solid swelling in the front of both knees, limited to the region of the bursa. For three years the swelling on both knees, but especially that on the left, had gradually increased, apparently from the patient's having had an unusual amount of kneeling to do. Three months before admission a small abscess formed in the swelling on the left side, and after bursting formed a sinus, which continued to discharge. A fortnight before admission another abscess formed in front of the left swelling, but it had not discharged itself. The patient had had good health previous to the swelling, and had no

personal tubercular history, although one uncle had died of consumption. Both swellings were excised, and the wounds healed satisfactorily.

When fresh, the thickening was gelatinous and somewhat translucent in character. The cavity in each case contained clear fluid, and to the lining membrane gelatinous and somewhat pendulous portions were attached. The spirit has hardened the walls and rendered them opaque. G. C. 3439.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

9. 18. Tubercular Enlargement of Bursa Patellæ.—Papier maché cast of the front of the left knee of the patient from whom the previous preparation was obtained, showing the enlargement of the bursa. G. C. 3440.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

d. Where the inflammation has been due to syphilis.

9. 19. Syphilitic Enlargement of the Bursa Patellæ.—Cast in gelatine and glycerine of the front of a left knee—illustrating the above.

The patient, a middle-aged woman, suffered from tertiary syphilis, and had gummata near the surface in various parts of her body. This enlargement subsided under iodide of potassium internally and local blisters. The cast shows a decided enlargement in the region of the bursa patellæ. G. C. 2873.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1888.

IV. NEW GROWTHS.

9. 20. Sarcoma of the Bursa Patellæ.—Fungating tumour of the bursa patella excised along with the adjacent skin—in spirit.

The patient was a woman of about 75 years. The enlargement had been present without causing any inconvenience for ten or twelve years; but about a month before admission to the Royal Infirmary, Edinburgh, it had begun to grow larger and cause her pain. It soon burst, and dis-

charged blood, and several severe bleedings occurred from it shortly after one another. The bursa and surrounding parts were dissected from the front of the patella, and the patient made a good recovery.

The greater mass of the swelling is apparently caused by extravasated blood. The case seems to have been one of sarcoma, developing in the thickened bursa. G. C. 3445.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

FASCIÆ AND CONNECTIVE TISSUE.

(It has not been thought necessary to repeat here the headings of the groups which have usually preceded that of "New Growths.")

NEW GROWTHS.

Ranging from the simple slow-growing forms whose tissues are well developed to the malignant rapidly growing forms whose tissues are more or less embryonic.

Fatty Tumours.

9. 21. Fatty Tumour.—Small fatty tumour—in spirit.

It was removed from over the lumbar spinous processes of a young woman. There was some difficulty in diagnosing it, especially as its date of origin was uncertain. The possibilities were a chronic abscess, spina bifida, or a fatty tumour.

The specimen is a good illustration of the lobulated character of a simple fatty tumour. G. C. 3208.

Presented by A. G. MILLER, F.R.C.S.E., 1890.

9. 22. Fatty Tumour.—Large fatty tumour, with a portion of adherent skin—in spirit.

It was removed from over the loin of a man.

The specimen shows on a larger scale than the last the lobules and fibrous septa of a simple fatty tumour.

G. C. 3168.

Presented by JOHN SHAW MACLAREN, F.R.C.S.E.

9. 23. Very large Fatty Tumour.—Section of the above with the over-lying skin—in spirit.

It was attached to the axilla, in an old woman, a subject in the dissecting-rooms.

The section shows the tumour to be composed of masses of fat bound together by layers of connective tissue into a uniform whole, which has no out-lying lobules. The centre of the tumour, where there is now a hollow, was filled with broken-down fat and oil, and many of the lobules near that part are softer in texture and darker in colour than those at the periphery. This has been a degenerative change, associated with the great growth of the tumour. G. C. 3287.

Presented by JOHNSON SYMINGTON, F.R.C.S.E., **1891.**

9. 24. Very large Fatty Tumour.—Papier maché cast of the previous specimen *in situ*, showing its relations to the arm and trunk. The tumour has evidently been slung in its covering of skin from the region of the axilla. Possibly, this fact may explain its want of separate outlying lobules. G. C. 3288.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1891.**

9. 25. Fibro-Fatty Tumour.—Lobulated fatty tumour, with fibro-fatty outgrowth projecting under the skin, the latter divided to show its structure—in spirit.

It was removed from the region of the hip.

The deeper part which has lain in the subcutaneous tissue has external lobules like those of an ordinary fatty tumour. The more superficial and larger part, which has pushed outwards and stretched the skin over it, is all in one piece. An examination of its surface of section shows it to be composed of layers of fat and fibrous tissue arranged in an irregularly concentric manner round a fibrous core, which unites it to the part below. G. C. 1197.

Presented by ADAM HUNTER, F.R.C.S.E.

9. 26. Fibro-Fatty Tumour.—Section of a tumour of the above nature—in spirit.

Long immersion in weak spirit has altered the appearance of this tumour, but it still may be seen to contain a larger proportion of fibrous tissue than is usual in an ordinary fatty tumour. G. C. 443.

9. 27. Large Fibro-Fatty Tumour.—Section of a very large fibro-fatty tumour, with the skin attached—in spirit.

The tumour was removed from a young man by Professor Syme. Having apparently begun in the perinæum, it had extended into the scrotum, and become attached to the testicle and cord on the left side. It had the appearance and feeling of "cerebriform tissue." The whole tumour was removed along with the testicle, and the patient recovered.

The section of the tumour shows it to be composed of numerous septa of fibrous tissue running through a mass of fat, and intersecting it as by an irregular meshwork. G. C. 1746.

Presented by Professor Syme, **1825.**

9. 28. Fibro-Fatty Tumour. — Section of a fibro-fatty tumour showing several cysts—in spirit. F. P. C. 2743.

Fibrous Tumours.

9. 29. Soft Fibrous Tumour. — Section of a pendulous subcutaneous tumour, with the adjacent skin—in spirit.

The tumour is composed of a somewhat loose arrangement of fibrous tissue. It was described formerly as "sarcoma simplex." G. C. 189.

9. 30. Soft Fibrous Tumour.—Small subcutaneous tumour, with the overlying skin—in spirit.

The tumour was circumscribed, and formerly described as "apparently simple sarcoma." B. C. X. 1. M. 11.

9. 31. Soft Fibrous Tumour.—Section of a small subcutaneous tumour, similar to the last—in spirit.

This was also formerly described as "simple sarcoma."

Its structure, as altered by the spirit, seems fairly uniform.

G. C. 105.

Presented by Professor JOHN THOMSON.

9. 32. Firm Fibrous Tumour.—Section of a large lobulated and seemingly encapsulated tumour—in spirit.

It was removed from below the right pectoralis minor, from a patient in the Royal Infirmary, Edinburgh.

The section has a somewhat "watered-silk" appearance by interlacing of firmer and laxer portions of fibrous tissue. Although for the most part encapsuled, it seems, at places above, to involve the adjacent muscular fibre. G. C. 201.

Presented by A. GILLESPIE, F.R.C.S.E.

Fibro-Sarcomatous Tumours.

9. 33. Fibro-Sarcomatous Tumour.—Sections of two large tumours removed from the right inguinal region—in spirit.

The patient was a healthy man, about forty. Two and a-half years before the operation a small lump had appeared in the groin. It had grown slowly in the line of the groin, extending both towards and away from the middle line. In about six months from its first appearance it had passed into the scrotum, and for about four months after that it had not altered much. In its later growth it had projected more and more forwards. The patient worked up to within a few days of the operation without his fellow-workers knowing that there was anything wrong with him, although the bulk of the tumour had somewhat interfered with his stooping. There were no abnormal sensations in left leg; he could move it as well as the other.

The tumour surface was smooth, but could be recognised to be made up of four or five masses. On the summit there were several small reddened elevations. The main mass below felt quite firm and hard, but the smaller upper portions were softer. There was no pain on pressure.

At the operation, Dr Joseph Bell easily dissected out the lower scrotal part along with the testicle. The upper part, however, had penetrated into the abdomen and involved the peritoneum, part of which was cut in removing the intra-abdominal mass. Besides the portions removed, there were other parts which passed so deeply into the pelvis that they could not be interfered with.

The patient made a good recovery from the operation, but his after history was not traced.

The larger part, to which the testicle and a piece of the skin is adherent, has the appearance in section of a well-formed, firm, fibrous tumour. The smaller part, while originally a continuation of the larger piece, is partially separated from it, and shows a much softer and more uniform structure, with a fibrous tissue less well developed. The portions which had to be abandoned seemed at the time to be softer still.

The specimen is an illustration of a tumour which, although firm, fibrous, and slow-growing in the main, has certain parts more rapidly growing and infiltrating in character, and correspondingly softer and more embryonic in structure.

G. C. 2754.

Presented by JOSEPH BELL, F.R.C.S.E., **1886.**

9. 34. Fibro-Sarcomatous Tumour.—Cast in gelatine and glycerine of the previous tumour, before operation, showing its relative size and external relations. G. C. 2754a.

Presented by JOSEPH BELL, F.R.C.S.E., **1886.**

Sarcomatous Tumours.

9. 35. Sarcomatous Tumour.—Small tumour, with overlying skin laid open from behind—in spirit.

It has involved the skin, and protruded through it towards the surface, but on its deeper aspect it has an indistinct capsule. Its substance is of a uniform, somewhat fibrous texture, with a small cyst developed in the interior. G. C. 948.

9. 36. Sarcomatous Tumour.—A large tumour with overlying skin laid open—in spirit.

"The tumour had been growing for eight years. The patient stated that it had followed a brain fever, during which 'he had several tumours on the back, all of which broke and dispersed excepting this one.' The tumour, about the size of two hands, lay between the shoulders. It was nodular on the surface, and had discharged blood and matter, so as to weaken his health."

At the operation, which was performed by Mr. Allen, hæmorrhage was profuse. Eleven arteries were tied, and the actual cautery applied in two places. The patient died a fortnight after the operation apparently of pyæmia.

The tumour has involved the skin and protruded through it. The cut surfaces show a series of fibrous intersections in a soft-looking substance, with an ill-defined capsule round about.

G. C. 974.

9. 37. Sarcomatous Tumour of the Abdominal Wall.—Large portion of skin of the abdomen, from which numerous nodules of tumour growth project—in spirit.

The patient was a married woman, aged forty. A tumour, composed of two masses "about the size of a fist," had originally been removed from her abdominal wall, and had been pronounced at the time of the operation to be sarcomatous. This tumour had returned, and had grown for two years before the patient consulted Dr. Thomas Keith, who removed it. Some years after the second removal, the patient was seen by Dr. Skene Keith. She was then in good health, without any indication of a return of the tumour.

The masses posteriorly have an imperfect form of capsule round them. Anteriorly they involve the skin.

G. C. 2922.

Presented by Thomas Keith, F.R.C.S.E., 1889.

9. 38. Sarcomatous Tumour Fungating.—Portion of skin, with a protruding tumour—in spirit.

"It was removed from the back."

The section shows fibrous intersections running through lobules of a softer material, which has burst through the skin.

G. C. 200.

Presented by Wm. Newbigging, F.R.C.S.E.

9. 39. Sarcomatous Tumour.—Two sections of "a malignant tumour" from a leg—in spirit.

The lower piece is apparently infiltrating the muscle, while the upper has that semblance of a capsule which is so often deceptive. G. C. 2055.

Presented by Alex. Watson, Esq., **1839.**

9. 40. Sarcoma of Arm.—Section of a large tumour, and part of the skin, through which it fungated—in spirit.

The tumour was growing beneath the biceps muscle. The arm was amputated at the shoulder-joint, and the patient made a good recovery.

The tumour was found to be separate from the bone. It lay beneath the biceps muscle, which was stretched over it. On section it was described as cerebriform in texture, and white in colour.

It now shows on section a few fibrous intersections in an opaque substance, which is mottled with a gelatinous-looking material breaking down into cysts. G. C. 732.

Presented by Dr Bell, Dundee.

9. 41. Sarcoma of Upper Arm.—Plaster of Paris cast of an upper and fore-arm, showing a large tumour below the biceps, which had fungated at one spot.

Two years ago a swelling appeared on the arm of a lady, about 50 years of age, near the insertion of the tendon of the biceps muscle. It increased gradually and uniformly from that time, impeding as it became larger the motion of the joint; and although at all times uneasy, yet it did not give her any great pain. Five weeks before she came to Edinburgh the tumour became suddenly more painful, acquiring at the same time a considerable increase of bulk. The gentleman who attended her, suspecting that suppuration was about to take place, applied emollient

poultices, and at the end of a fortnight the most prominent part of the tumour burst, and discharged a quantity of thin, bloody, ichorous matter. The discharge continued, and became very offensive to the smell; the pain increased, the swelling enlarged, and a *fungous* excrescence appeared at the opening from which the matter had been discharged. She became feverish, restless, and uneasy, and the case being considered cancerous, she came to Edinburgh. The amputation of the arm being thought necessary, the operation was performed. The tumour on dissection presented a structure in every respect similar to that described in page 107 (9. 50b), and delineated in plate v. Nothing particular occurred during the progress of the cure, excepting that the ligature on the brachial artery did not come away till about three months after the operation. Soon afterwards she was attacked by violent pains in the leg and thigh, which were supposed to be rheumatic, and several swellings appeared in the breast, and one near the spine, which, from what I could learn, probably resembled the original swelling of the arm. I never saw her after this time; but I was informed that she died in great agony, in seven months from the time the arm was amputated. *Vide* "Observations on Fungus Hæmatodes or Soft Cancer, etc., with Cases and Dissections. By James Wardrop, F.R.S.E., F.R.C.S.E., etc., 1809, page 113.

The breadth of the arm seems to have been exaggerated by flattening of the cast. F. P. C. 2905.

9. 42. Sarcoma of Thigh.—Section of a large tumour and adjacent skin—in spirit.

It was removed from the thigh of a man aged 40 years.

The tumour is somewhat lobulated, and has on section a fibrous appearance, with numerous small cysts. Its section resembles that of No. 7. 41; the fibrous appearance, however, being more marked, and the cysts smaller. G. C. 745.

9. 43. Cystic Sarcoma.—Section of a very large cystic sarcomatous tumour—in spirit.

It was extirpated from among the muscles of the thigh, but the patient died from the operation.

The cut surface shows the tumour to be composed of a delicate fibrous network, enclosing a soft material, which in many places has been replaced by cysts, some of considerable size. G. C. 107.

Presented by W. Brown, F.R.C.S.E.

9.44. Sarcoma.—Portion of a small tumour which has apparently fungated through the skin—in spirit.

It seems on section to have a somewhat variable consistence. G. C. 763.

9. 45. Sarcoma.—Fungating tumour, laid open from behind, with the adjacent skin attached—in spirit.

The tumour was dissected from over the crest of the ilium of a man aged 60 years. The patient recovered perfectly from the operation.

The cut surface of the tumour shows a series of delicate septa of fibrous tissue, separating lobules of a soft material, which is in some places breaking down. The tumour has the appearance of being encapsuled on its deep aspect.

G. C. 778.

Presented by William Newbigging, F.R.C.S.E. **1825.**

9. 46. Sarcoma.—Section, in spirit, of what was a very large tumour.

It was removed after death. It occupied the whole side of the neck above the clavicle, and "seemed to originate in the cellular substance, the muscles over it being expanded, and the cervical nerves" (passing) "through it apparently sound. The tumour was of a rich dark brown colour, and consisted chiefly of a pulpy matter, contained in a fibrous network. The spirits have removed the colour."

Except that the lobules are smaller, the structure of this specimen is similar to that of the last. G. C. 228.

Presented by Professor J. W. Turner.

9. 47. Very Large Sarcoma.—Section of an enormous tumour—in spirit. It has a variable consistence having evidently been softening in some places more than in others. It is largely composed of a structure like that of the foregoing specimen, in which strands of delicate fibrous tissue intersect a soft substance. In many places, however, the soft substance shows no inter-

sections. This specimen was formerly numbered G. C. 857, but the description of that number does not at all apply to this specimen. G. C. 857.

Presented by ADAM HUNTER, F.R.C.S.E.

9. 48. Large Sarcoma.—Section of a large sarcomatous tumour—in spirit.

"It was removed from the back."

The cut surface shows it to consist of an interlacement of strong fibrous bands, forming compartments of variable size, which contain a soft, friable-looking substance, in many places breaking down. G. C. 187.

9. 49. Large Sarcoma.—Section of a large tumour, with adherent skin—in spirit.

"It was successfully removed from the neck by Sir Everard Home. The patient recovered so well as to leave the hospital, but was then lost sight of."

The tumour consists, like the previous specimen, of an interlacement of fibrous bands, forming large and smaller subdivisions, the latter of which contain a soft material, in many places breaking down. The spaces, however, in this specimen are larger, and the tumour is more definitely separated into lobules by the connective tissue. The other portion is in the Museum of the Royal College of Surgeons of England. B. C. x. 1. M. 4.

9. 50. Large Sarcoma.—Section of a large sarcomatous tumour from the arm, with a portion of the thinned skin which lay over it.

This tumour, like the last, is seen on section to be composed of several large masses, separated by fibrous septa, each mass being subdivided by septa into small lobules of soft material. The lobules of several of the masses are softening and breaking down. G. C. 577.

Presented by JOSEPH BELL, F.R.C.S.E.

9. 51. Large Sarcoma.—Plaster of Paris cast of what has probably been the tumour from which the previous specimen was obtained. G. C. 565.

9. 52. Sarcoma of Forearm.—Section of a large fungating tumour—in spirit, growing from the fasciæ of the forearm. It protruded through the skin, and appeared as a large cauliflower-like bleeding fungus.

The cut surface, although with some fibrous-like interstices, is comparatively uniform. The muscles below the fasciæ do not seem involved. G. C. 184.

Presented by Wm. Newbigging, F.R.C.S.E., and Professor J. W. Turner.

9. 53. Sarcoma of Forearm.—Portion of a fungating sarcoma of the right forearm—injected with vermilion, and in spirit.

"The patient was a woman 47 years of age. About three years before she came under Dr. Brown's care she perceived a small tumour, the bulk of a common garden-pea, underneath the skin of the back of the forearm, a little above the wrist, which was quite movable. It increased gradually to the size of a hen's egg, in which state it remained for two years. After this period it increased rapidly, and she was advised to get it removed. The operation was performed and the wound healed up, excepting a spot about the size of a shilling, which was suddenly affected with a violent stinging pain. The surface of this ulcer began to be elevated above the surface of the adjacent skin, and increased after that time, so as to attain the size of the tumour represented in the plate" (see Cast, No. 9. 54). . . .

"The whole mass resembled, in a very remarkable degree, a portion of brain—in colour, consistence, and every external character; and as the arm was injected with coloured size, many vessels could be traced through the substance of the tumour, being a strong proof of its organisation. It became also like brain, softer by exposure to the air, and readily mixed with water. It appeared to be composed of several distinct portions, separated from one another by thin membranous partitions."—From Observations on "Fungus Hæmatodes, or Soft Cancer," &c., with Cases and Dissections by James Wardrop, F.R.S.E., F.R.C.S.E., &c., 1809, pages 107–109.

The cut surface shows traces of fibrous intersections, but the texture is on the whole uniform and very vascular.

G. C. 109.

Presented by WILLIAM BROWN, F.R.C.S.E., **1808.**

9. 54. Sarcoma of Forearm.—Plaster cast of the right forearm and part of hand from which the previous specimen was obtained. The cauliflower-like fungating mass projecting through the skin is well shown.

This cast, or the arm itself, has been figured in Wardrop's Work on "Fungus Hæmatodes," Plate 4. In the Plate, however, the artist has drawn a left hand, but it is evident that this has been added after the sketch of the tumour was made. The tumour itself, figured in Plate 5, as the specimen belonging to the same arm as that shown in Plate 4, undoubtedly has grown on the right side. This has been determined from the portion of the ulna left attached to the tumour.

F. P. C. 2903.

9. 55. Sarcomatous Tumour.—Portion of a sarcomatous tumour flocculent and broken down.

Entered as a specimen of "fungus hæmatodes."

G. C. 1747.

Presented by Dr. THOMSON.

9. 56. Sarcoma of Neck.—Portion of a tumour removed from the neck—in spirit.

The tumour has apparently been invading the muscle round about and breaking down in the centre. G. C. 3143.

Presented by MACDONALD BROWN, F.R.C.S.E., **1890.**

9. 57. Sarcoma of the Buttock.—Section of a small fungating tumour—in spirit.

It grew upon the buttock of a girl about 12 years of age. It projected in the form of a rounded fungus of a dirty red colour, the surface of which occasionally peeled off and bled profusely. After it was extirpated, the wound cicatrised and remained sound, but in about two months a deep-seated tumour suddenly appeared in the groin, attended with severe pain. This grew rapidly to a large size, dipping towards the abdomen. The leg became œdematous, and the patient died.

The tumour is composed of numerous septa of delicate connective tissue, enclosing small lobules of a soft material.

G. C. 920.

Recurrent Fibroid Tumours.

9. 58. Recurrent Fibroid Tumour of the Loin.—Section of a tumour with a cicatrix in the overlying skin, removed from the loin of a young woman for the third time—in spirit.

The following notes of the case are taken from Professor Spence's Surgery, vol. i. 2nd edition, page 186.

"Jane Easton first consulted the late Dr Maclagan in the year 1832. At that time she was 22 years of age, and applied for advice in consequence of a tumour of some three years' growth, situated in the left lumbar region, about one inch from the spine. It was about the size of a jargonelle pear, firm, but elastic in consistence, and freely movable. Below the tumour the skin for some little distance was indurated. The tumour, and also the adjoining diseased skin, were removed, and the growth was on examination found to present the ordinary characters of a simple fibrous tumour. About a year afterwards, however, a recurrence of the growth took place, in the form of three small tumours, situated in the cicatrix, resulting from the former operation. These tumours, together with the scar, were thoroughly removed by Dr Douglas Maclagan in 1834; but again, 18 months later, the growth for the third time appeared in the same situation as before. After increasing in bulk for a year and a half, this was also removed by Dr D. Maclagan, and was found to possess the same firmness and elasticity, and to present the same semi-transparent pinkish-grey colour as was noticed in the original tumour."

About twenty years afterwards, *i.e.* March 1857, she was seen by Professor Spence, on account of another tumour, 2½ in. long, 1½ broad, and 1½ in. at its thickest part. This tumour had grown for a year in the old cicatrix. It was of an elastic nature, and had a pinkish translucent appearance at the surface. It was freely removed, along with the adjacent lumbar fasciæ and surrounding scar, and there was no return. In 1868 the patient again came under Professor Spence's care for a firm, fibrous tumour of the right mamma, of about the size of a small half melon. This and the mamma were removed, and she made a good recovery. On

27th August 1870 she applied to Professor Spence again on account of a second growth in her breast near the cicatrix of the last operation. It had been growing for some months, and had reached the size of a small melon. This was also removed successfully. On 2nd June 1871 Professor Spence was called to see her. She was then in a moribund condition from broncho-pneumonia and pericarditis, with inability to swallow even fluids. There was a discharging ulcer in her right arm-pit. This had been due to a swelling which formed near the cicatrix of the last operation, and had then burst and discharged matter. At the *post-mortem* examination numerous small white nodules were found in the left pleural sac, varying from the size of a millet seed to that of a pea. There was a fibrous structure of the œsophagus near the stomach, and three fibroid tumours attached to the uterus. It is difficult to say whether the axillary ulcer was due to a softening tumour or not. Possibly a recurrent tumour had given rise to the nodules in the pleura. This case is referred to by Sir James Paget in his lectures on Pathology.

The specimen shows a somewhat uniform texture without any capsule separating it from the fasciæ round about. On the skin are well seen the cicatrices due to former operations.

G. C. 1831

Presented by A. D. Maclagan, F.R.C.S.E., 21st October 1836.

9. 59. Recurrent Fibroid Tumour.—Portion of a left arm after amputation, showing several sarcomatous tumours laid open—in spirit.

James D., aged 78, was admitted to the Royal Infirmary on 13th August 1892, complaining of lumps in his forearm, which were sometimes painful.

About 18 months before admission, the patient's daughter had drawn his attention to a swelling on his left forearm, almost as big as the present one. He had been quite unaware of its presence up to that time. It was situated on the inner aspect of the forearm on its upper third. The mass grew much larger in a short time, and was removed by Dr Dickson, Carnoustie, on 26th July 1891. The wound had just healed, when a second lump made its appearance, and this, he thinks, did not grow so quickly as the first, and did not attain the same size. It was also removed by Dr Dickson in November 1891. Another growth appeared, and was removed in March 1892. These fresh growths appeared in the region of the first, close to the wound of operation. About a month or six weeks after the last operation another lump appeared, this being rather higher up the forearm, according to the patient, than the previous ones. The growth was not very rapid at first, but during the last month had grown very rapidly. The patient was recommended by Dr Dickson to go to the Edinburgh Infirmary, which he did.

The patient on admission was a healthy-looking man, very vigorous for his years. There were extensive scars on the upper and outer parts of his left forearm and lower part of the upper arm. Just above the elbow, below a portion of the scar, a large mass of new growth projected on the outside, and reached over the front to the inside. The skin over it was thin, very vascular, and of a purple plum-colour. On the forearm, beneath the cicatrices, were two separate nodules about the size of a bantam's egg, which did not involve the skin. The hand was useless, and the fingers were stiff.

The arm was amputated on August 9th, and the patient made a good recovery.

On section the substance of the large mass was like that of an inflamed lymphatic gland, grey in colour, soft, juicy, and vascular in texture, and at one or two places it showed a softening like mucoid degeneration. It seemed encapsuled at most places, but at one spot the muscles were infiltrated. The substance of the smaller nodules was firmer and less vascular, but similar to that of the large mass. Microscopically the tumour is composed of round and spindle cells. G. C. 3447.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1892.**

9. 60. Recurrent Fibroid Tumour.—Papier-maché cast, showing the appearance before operation of the arm from which the previous specimen was taken. G. C. 3448.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1892.**

9. 61. Large Recurrent Fibroid Tumour.—Section of a large recurrent fibroid removed for the fifth time from the back without dissemination—in spirit.

John Allister, an elderly man, noticed in 1805 a small tumour, the size of a hazel nut, above the left haunch. It was movable, elastic, and of the colour of skin. In three years it had grown to be the size of a hen's egg. At that time he fell and struck it, when it inflamed, became painful, and soon was as large as two fists. It got still larger, and was *dissected out by Mr Newbigging* on 29th May 1810, at which time it had

reached the dimensions of a child's head. The wound healed up, and the patient remained well for nine months, when the tumour reappeared, and had reached the size of two fists by 29th October 1811, when *Mr Russell excised it.* The cicatrix healed up, but in nine months again it grew and increased gradually to the size of the head of a child seven or eight years old, with the skin over it inflamed, and a dark fungus protruding. It was *dissected out by Mr Allan* from among the muscles of the back. It again healed; but in seven months the tumour reappeared and grew very quickly, so that in two months more it was as big as at the last operation. It had a spongy elastic feeling. The skin at some places was congested over it. It was *removed by Mr John Bell*, and the patient made a good recovery. He went home till March 1815, when he found the tumour beginning for the fifth time. It grew quickly, and by June 13, 1816, it formed a large pedunculated mass. His health was now impaired. The tumour was removed by Mr Allan by a ligature gradually tightened, but it returned again early in 1817, and by the 9th of September, when he returned to Edinburgh, the disease formed a mass as follows:—"The tumour was lobulated, and in three divisions; the largest, the size of a quartern loaf; the second, the size of the head of a full-grown fœtus, and the third smaller; in all, three feet across at the base. From the surface of these there sprung three fungi respectively of the size of a full-sized cauliflower, a fist, and a small apple. He died about the 22nd January 1818 from exhaustion, but without visceral affection. Thus he lived about thirteen years from the first appearance of the tumour, and seven years eight months after the first removal." See Allan's Surgery, vol. i. p. 264. Maclachlan & Stewart, 1821.

The tumour is somewhat lobulated, of a soft uniform texture, with very little fibrous tissue in the interior. It is tending to degenerate at numerous points so as to form small cysts. G. C. 973.

9. 62. Large Recurrent Fibroid Tumour without Dissemination.—Another portion of the foregoing tumour showing similar characteristics. G. C. 973a.

9. 63. Enormous Recurrent Fibroid Tumour without Dissemination.—Plaster of Paris cast of the back of an adult showing an enormous fungating tumour.

This is most probably the cast from the patient from whom the previous two specimens were obtained. It must have been taken not long before his death, and after the tumour had recurred for the fifth and last time. A cause of uncertainty, however, is that this tumour is on the right side, whereas the previous specimens were described originally as having been above the left haunch. Possibly, however, the tumour in its recurrence had attacked chiefly the right side, or there may have been a misprint. G. C. 3502.

9. 64. Recurrent Fibroid Tumour, which became disseminated.—Papier-maché cast of a tumour in the groin before its removal for the third time from the same place.

Mrs B., aged 55, received a blow above the right knee. Five months afterwards (June 1879) a tumour of the size of an orange was removed from the injured place; another tumour was removed from the same place in June 1881; another in January 1883; and a fourth in May 1883. There was no return above the knee, but from the groin a similar tumour was removed in June 1883, a second from the groin was removed in November 1883, and a third (of which this is a cast) in June 1884. While the wound from the last (seventh) operation was healing, numerous nodules appeared in the subcutaneous tissue at various parts of the body, and some could be felt within the abdomen. The patient died shortly afterwards, and at the *post-mortem* examination nodules of sarcoma were found in the liver, lungs, and heart, and in many parts of the subcutaneous tissue.

G. C. 2738.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1891.**

9. 65. Cicatrix after Removal of a Recurrent Tumour.—Cast in gelatine and glycerine of the outer side of the left knee of the patient Mrs B., mentioned above, showing the sound scar at the place from whence the first four tumours were removed. G. C. 2874.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1891.**

Dissemination of Sarcoma.

9. 66. Secondary Sarcoma in the Heart.—Preparation of the heart of an elderly man, with both ventricles laid open to show sarcoma in the wall—in spirit.

Several years before death the patient had undergone amputation of the leg for a round-celled sarcomatous growth, which had developed in an old ulcer. The stump (*vide* 11.84) remained sound, but the disease returned in the brain as well as in the heart and lungs.

The heart is attacked by secondary deposits of sarcoma which have caused pericarditis, and in consequence adhesion of the surfaces of the pericardium. Near the apex of the right ventricle the invasion of the muscular substance by the disease is especially well seen. A portion of the adherent pericardium has been dissected away from the front and upper parts of the heart. G. C. 2815.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1888.

9. 67. Secondary Sarcoma in the Lung.—Portion of a lung, imperfectly injected with vermilion, from the same patient as the last—in spirit.

One large and several smaller nodules of tumour substance are shown in the interior of the lung. G. C. 2816.

9. 68. Secondary Sarcoma in the Lung.—Section of a lung, studded with nodules of sarcoma of varying size—in spirit.

The patient, a young person, had suffered from a large sarcoma of the thigh, which was removed after ligature of the deep and superficial femoral artery as well as of the vein. The patient recovered from the operation, but died from return of the disease in the lung.

The lung is studded with rounded nodules of sarcomatous substance. G. C. 3270.

Presented by JOHN DUNCAN, F.R.C.S.E., 1891.

Melanotic Sarcoma.

9. 69. Melanotic Sarcoma.—Portion of the above—in spirit.

It is apparently well defined on the surface, and somewhat soft and friable in the interior. The dark pigmentation is quite distinct. F P. C. 2816.

9. 70. Melanotic Sarcoma.—Portion of the above laid open, and in spirit.

The specimen was taken from a patient, who had a number of tumours of a similar kind, and of various sizes, on different parts of his body.

It was described as of "cerebriform texture," but of a dark, brown colour, nearly black. The colour has now partly faded from the action of the spirit. G. C. 426.

Presented by Professor J. W. Turner.

9. 71. Melanotic Sarcoma.—Another tumour from the same patient as the last—in spirit.

The integuments over the tumour had ulcerated.

One part consists of a dark-coloured, loosely flocculent material; the rest is of a white colour, and has a somewhat firmer appearance. G. C. 424.

Presented by Professor J. W. Turner.

9. 72. Melanotic Sarcoma.—Another melanotic sarcoma presented at the same time as the last two, and probably, therefore, from the same patient. G. C. 425.

Presented by Professor J. W. Turner.

Chondro-Sarcoma.

9. 73. Chondro-Sarcoma from the Thigh.—Portion of a "fungus

fibro-cartilaginous " tumour from the thigh of an elderly woman —in spirit.

The tumour consists of portions of cartilage, which at places is calcifying, and is embedded irregularly in more or less embryonic fibrous tissue. This may be classed as a chondro-sarcoma calcifying. The exact seat of origin is unfortunately not recorded. G. C. 1047.

DIVISION III.—THE LIMBS AS A WHOLE.

SERIES X.—DEVELOPMENT OF THE LIMBS.

10. 1. **Development of the Limbs.**—Plaster of Paris cast of an enlarged model, by Professor His, of an early stage of development of a human fœtus.

The buds projecting from either side of the trunk afterwards become the upper and lower limbs. G. C. 3505.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

10. 2. **Development of the Limbs.**—Plaster of Paris cast of an enlarged model, by Professor His, of a later stage of development of a human fœtus.

The buds from the trunk are now subdivided by a slight constriction into their two main portions. G. C. 3526.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

SERIES XI. INJURIES, DEFORMITIES, AND DISEASES OF THE LIMBS AS A WHOLE.

RECENT INJURIES.

11. 1. Machinery Accident to Hand.—Right hand amputated for severe injury—in spirit.

The soft parts and bone on the ulnar side are completely destroyed, and the palm is extensively lacerated and crushed. The point of the forefinger is torn off and hangs by a tendon.

G. C. 2739.

11. 2. Machinery Accident to Hand.—Part of a forearm and remains of the hand—in spirit.

The hand has been so crushed and torn that it is scarcely possible to recognise from what part of the body it has come. The tendons are hanging loose, the bones are crushed, and the skin for the most part has been torn away. G. C. 3522.

11. 3. Severe Burn of the Hand.—Greater part of a left hand showing the almost entire destruction of the skin of the hand and fingers—injected with gum and vermilion, and in spirit.

The man, aged 28 years, while drunk, fell into the fire and burned both his hands so severely, that they had to be amputated. On the right side the amputation was carried through the middle of the forearm.

The specimen shows well the development of granulations

and the sloughy condition of the ends of the fingers. The little and third fingers were sawn up for other preparations.

G. C. 2787.

Presented by JOHN DUNCAN, F.R.C.S.E., 1888.

RESULTS OF INJURIES.

11. 4. Contraction of the Fingers from a Burn.—Gelatine and glycerine cast of the right hand of a woman—illustrating the above.

The skin of the back of the hand has been destroyed by a burn, and the three inner fingers are in consequence drawn together, and partly dislocated backwards. The deformity was afterwards improved by a plastic operation by Mr J. Shaw M'Laren. G. C. 3203.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1890.

11. 5. Hand deformed by a Burn.—Plaster of Paris cast of the hand and forearm of an old man—illustrating the above.

In childhood his hand had been severely burned. Some of the fingers had evidently been destroyed, and as the skin contracted during the healing of the burn, the fingers were drawn in, and the hand distorted.

The forearm ends in a club-shaped extremity, bent over towards the flexor aspect of the forearm, and furnished with three nobs, which having nails, are recognisable as fingers.

G. C. 3523.

Presented by CHARLES W. CATHCART, F.R.C.S.E., 1893.

11. 6. Distortion of the Foot from Injury.—Inner half of a left foot—in spirit, illustrating the above.

The foot had been crushed many years before, and in consequence had been greatly drawn up. The patient, a man about 40, had walked

entirely on the balls of his toes. An ulcer, which formed below the heel, had given him so much trouble, that he wished the foot amputated.

The bones were atrophied and fatty, see No. 6. 15.

The skin over the forepart of the foot and toes is coarse. The papillæ are enlarged, especially on the second toe, which has a club-shaped extremity, and a very warty surface.

G. C. 2818.

Presented by P. H. MacLaren, F.R.C.S.E., 1888.

11. 7. Distortion of Foot by Compression.—Plaster cast of the right foot of a Chinese lady, showing distortion, artificially produced.

The four outer toes are doubled under the sole. The metatarsal and central tarsal bones are forced upwards, so that the ball of the great toe nearly touches the heel, and the usual arch of the foot is now represented by a narrow cleft in front of the heel. The bones generally, but especially the tarsal bones, have evidently been stunted in their growth.

G. C. 3534.

Presented by Charles W. Cathcart, F.R.C.S.E., 1893.

11. 8. Hand distorted from Injury to the Ulnar Nerve.—Plaster of Paris cast of a right hand, illustrating the above.

By a machinery accident, 5½ years before the cast was taken, the hand and forearm of the patient, a woman, had been severely lacerated, and the thumb destroyed. Her hand remained from that time stiff, powerless, and very painful, and gradually assumed this shape.

The exaggerated extension of the first phalanges, with flexion of the last two, is, as Duchenne pointed out, due to atrophy of the intrinsic muscles of the palm, following paralysis of the ulnar nerve. The deformity is known as "main au Griffon," or "Claw hand." G. C. 3111.

Presented by Charles W. Cathcart, F.R.C.S.E., 1889.

DEFORMITIES OF THE LIMBS.

Upper Limb.

a. From Deficiency in Development.

11. 9. Deficient Development of the Hand.—Plaster of Paris cast of the arm of a child, illustrating the above.

The hand is wanting, and only a few rudimentary stumps indicate fingers. G. C. 2548.

Presented by Dr Braidwood.

11. 10. Congenital Absence of the Radius.—Plaster of Paris cast of the left hand and forearm of a young person, showing distortion, consequent on the above.

The forearm is bent towards the radial side, and the ulna projects at the wrist. The forearm is clumsy and short. The thumb is poorly developed, and has apparently been devoid of much power of movement, but the four fingers are long and well developed. G. C. 3291.

Presented by John Thomson, M.D., **1890.**

11. 11. Deficiency of Radius (?).—Plaster cast of the right hand of an infant, said to be four months old, apparently illustrating the above.

The hand is bent in upon the radial side, so that the fore-finger touches the side of the forearm. The thumb is absent. The hand was said to have become straight, some years after the cast was taken. G. C. 2547.

Presented by Dr Braidwood, **1880.**

11. 12. Deficiency of the Radius (?).—Plaster of Paris cast of the left hand from the same infant as the last, showing a similar deformity.

There is, on this side, the stump of a thumb, and the fingers are more of a normal shape than those of the other hand. This hand is stated to have remained contracted, while the other improved. G. C. 2547.

Presented by Dr. Braidwood, **1880.**

11. 13. Congenital Annular Constriction of the Fingers.—Plaster cast of a left hand of a child, illustrating the above.

The child, Joseph K., was two years old when the cast was taken.

The thumb is absent, and the first, second, and third fingers show a marked constriction close to the joint, between the last two phalanges. G. C. 3409.

Presented by T. Burn Murdoch, M.B., **1892.**

11. 14. Congenital Annular Constriction of the Fingers.—Plaster of Paris cast of the right hand of the same child.

The thumb and little finger are well formed. The others are more or less stunted. The index finger seems to have a first phalanx, and a constricted stump of the second. The middle finger seems to have a first phalanx, and a bulging stump of the second. The third finger has the first phalanx, and a bulging and elongated stump of the second.

G. C. 3408.

Presented by T. Burn Murdoch, M.B., **1892.**

b. From excess in development.

11. 15. Triple Thumb.—Plaster of Paris cast of the right hand of a child, James C. P., illustrating the above.

The thumb is replaced by three fingers. None of them are thumb-like, each apparently having three phalanges.

G. C. 3411.

Presented by T. Burn Murdoch, M.B., **1892.**

11. 16. Congenital Hypertrophy of Finger.—Cast in glycerine and gelatine of a baby's hand and forearm, illustrating the above.

The finger had been unusually large at birth, and had afterwards increased still more out of proportion to the others. It was amputated by Dr Joseph Bell the day after the cast was made.

The finger is about one-third longer and three or four times thicker than the others. The end of the finger is about the same girth as the infant's wrist. G. C. 2731.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1884.**

Lower Limb.

a. From deficiency in development.

11. 17. Congenital Absence of the Lower Half of the Tibia.—Right lower limb of a newly born infant, dissected from the thigh downwards, showing the condition of the structures accompanying the above malformation—in spirit.

The child was born at full term. The parents were healthy and without any history of malformation on either side. The child died of atelectasis, twelve hours after birth.

The tibia is apparently well formed at the knee-joint, but half-way down it tapers to a fine point, which had partly projected through the skin. The fibula is unusually strong, and is bent inwards near its lower end. The foot is displaced inwards, as in talipes varus, and the astragalus articulates with the side of the lower end of the fibula. The muscles are fairly well developed. G. C. 2504.

Presented by WILLIAM CRAIG, F.R.C.S.E., **1878.**

(For full description of the dissection, *vide* the account of the case by Dr Craig in *The Journal of Anatomy and Physiology*, vol. xii. 1878.)

11. 18. Congenital Absence of the Tibia.—Lower end of the femur with the patella and leg of a young child dissected and in spirit, illustrating the above.

The specimen shows the relation of parts in a case where the tibia was congenitally absent. The lower end of the femur is rounded, and had no articulation except with the patella. The fibula is well formed and straight. The astragalus is altered in shape, and articulates with the lower end of the fibula. The foot is twisted inwards, and the heel is drawn up as in talipes equino-varus. The muscles and tendons are fairly well developed. G. C. 3369.

Presented by JOHN THOMSON, M.D., **1891.**

11. 19. Congenital Absence of the Tibia.—Drawing by Dr John Thomson, illustrating the dissection of the previous specimen. G. C. 3370.

Presented by JOHN THOMSON, M.D., **1891,**

11. 20. Congenital Absence of the Fibula (?)—Cast in glycerine and gelatine of part of a right leg and foot—illustrating the above.

The foot has been so completely everted that the tibia has been continued directly to the ground. There are only two toes besides the great toe. G. C. 3594.

Presented by E. GOLDMANN, M.D., Friburg z. Baden, **1893.**

11. 21. Annular Constriction of the Toes.—Plaster of Paris cast of foot of J. K., aged two—illustrating the above.

There is a constriction upon the third toe, similar to that seen in the casts of the fingers of the same child, Nos. 11. 14 and 11. 15. G. C. 3410.

Presented by T. BURN MURDOCH, M.B., **1892.**

b. From excess in development.

11. 22. Giant Great Toe.—Glycerine and gelatine cast of a left foot—illustrating the above.

From a young woman, aged 18. There was no family history of deformity. At birth both the first and second toes were unusually large, and they grew much more rapidly than the others. The second toe, being the larger, was amputated in infancy. Some years before the cast was taken the great toe had ceased to grow; but as the projection of the nail caused inconvenience, it was excised by Mr A. G. Miller.

The enlargement seemed to be chiefly in the soft parts. The three outer toes and the outer parts of the foot are apparently normal. The enlargement of the great toe extends backwards over the dorsum to about opposite the base of the first metatarsal bone. G. C. 2856.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1888.**

11. 23. Normal Foot.—Gelatine and glycerine cast of the right foot of the same patient—made for the sake of comparison.

G. C. 2857.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1888.**

Distortions in position—Talipes.

11. 24. Talipes Calcaneous.—Lower limbs of an infant—in spirit.

The left is in position of marked calcaneo-valgus, while the right (originally similar?) was dissected to "show that the bones and cartilages of the foot are apparently normal."

W. C. H. 44.

11. 25. Talipes Equino-Varus.—Plaster of Paris casts of the feet of an infant affected with the above.

The eels are distinctly drawn up, and the feet are twisted so that the outer edges project downwards, and the inner edges upwards. G. C. 3524.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

11. 26. Talipes Equinus.—Plaster cast of the right foot of a young person, showing a marked example of talipes equinus.

The heel is drawn up, and the dorsum of the foot is in line with the leg. The person must have walked on the balls of the toes. There is no lateral deviation of the foot.

G. C. 3506.

11. 27. Talipes Equinus.—Plaster cast of the left foot of an adult, with a very marked degree of talipes equinus.

The person must have walked on the balls of the toes. The foot is in direct line with the leg. The outline of the dorsum of the foot is at an angle with that of the leg, in a direction the reverse of what is usual. G. C. 3507.

11. 28. Talipes Cavus.—Plaster cast of a left foot—illustrating the above.

The foot, which is unusually short and well arched, is slightly abducted. The toes are strongly flexed at the second joint, and over extended at the metatarsal phalangeal joint. Duchenne has pointed out that the abduction and hollow shape of the foot is due to weakness of the gastro-cnemius and soleus muscles.

G. C. 3508.

11. 29. Slight Degree of Talipes Varus.—Plaster of Paris cast of the right foot of a young person, illustrating the above.

There is some inversion of the foot, with an increase of the longitudinal arch. The toes are flat, and the sole must have come well on the ground. G. C. 3509.

11. 30. Slight Degree of Talipes Varus.—Plaster of Paris cast of a right foot, illustrating the above.

Tho foot is short and decidedly inverted, though the sole has rested well on the ground. G. C. 3510.

11. 31. Slight Degree of Talipes Varus.—Plaster of Paris cast of a left foot, illustrating the above.

There is a marked shortening and inversion of the foot. The sole has evidently been planted flat on the ground, and the toes are straight. G. C. 3511.

11. 32. Slight Degree of Talipes Varus.—Plaster of Paris cast of a left foot, illustrating the above.

There is a marked inversion of the foot, and a slight raising of the inner side. G. C. 3512.

11. 33. Talipes Equino-varus with Genu-Valgum.—Plaster cast of a right lower limb from a little above the knee, illustrating the above.

There is decided genu-valgum along with the talipes equino-varus. The person has evidently walked on the fore-part of the outer side of the foot, the heel, as well as the inner border of the foot, being drawn up. There is marked inversion of the foot, and the head of the astragalus projects on the outer side. G. C. 3513.

11. 34. Talipes Varus.—Skeleton of a right foot—macerated, illustrating the above.

The patient was a man aged 50, who had suffered from infantile paralysis in childhood. The limb had been completely paralysed, and the foot was so much in the way that he desired to have it amputated.

The preparation shows that the cuboid and scaphoid bones have been displaced inwards, leaving a portion of the articular surfaces of the astragalus and os calcis exposed. These surfaces, which formed a projection on the outer side of the foot, were in the recent state covered with fibrous tissue. The bones are light and fatty. G. C. 3315.

Presented by A. G. Miller, F.R.C.S.E., 1891.

11. 35. Marked Talipes Varus.—Plaster of Paris cast of the left foot of a young person, illustrating the above.

The foot is strongly inverted, and the inner edge is raised, so that the person must have walked on the outer edge of the foot only. G. C. 3514.

11. 36. Talipes Equino-Varus.—Plaster of Paris cast of the right foot of a young person, illustrating the above.

The heel is drawn up and the foot inverted, so that the outer border comes next the ground. The toes are flexed and crushed together, and the great toe is opposed to the others. This is the position assumed in complete paralysis of the foot and leg. G. C. 3515.

11. 37. Advanced Talipes Equino-Varus.—Plaster of Paris cast of a right foot, illustrating the above.

The heel is drawn up, the foot inverted, and the inner edge so much raised, that the person must have walked upon the outer side of the dorsum of the foot. G. C. 3516.

11. 38. Extreme Talipes Equino-Varus.—Plaster of Paris cast of a left foot, illustrating the above.

The heel is drawn up, and the foot is so twisted that the sole is directed upwards. The weight of the body must have been borne upon the dorsum of the foot. G. C. 3517.

11. 39. Talipes Valgus.—Plaster of Paris cast of the left foot of a young person, showing a marked example of talipes valgus.

The patient suffered from almost complete paralysis of both legs, apparently congenital.

In this case the peroneus longus being less affected, had drawn the outer edge of the foot up, so that the inner edge was presented to the ground. G. C. 3518.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

11. 40. Talipes Valgus.—Plaster of Paris cast of the right foot of a young person, affected with the above.

The outer edge of the foot is somewhat raised, but the deformity is not so marked as in the previous case.

G. C. 3525.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

Flat Foot.

11. 41. Flat Foot, from Injury.—Plaster of Paris cast of a right foot, illustrating the above.

The patient, a healthy man of 28 years, stated that when 10 years of age he fell from a height of twenty feet, and landed on his feet. For nine months after the accident he had been a patient in the Dundee Infirmary, and for nine months more he had been unable to walk properly. After that, however, he quite recovered the use of his feet, although they remained deformed. He was under treatment in the Royal Infirmary, Edinburgh, for fracture of the pelvis when this cast was taken.

G. C. 2771.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1887.**

11. 42. Flat Foot.—Plaster of Paris cast of a left foot, showing flat foot.

The foot was somewhat shrunken, and the epithelium had peeled off before the cast was taken. The head of the astragalus forms a projection below the inner maleolus, while below and in front of the astragalus there is a projection formed chiefly by the scaphoid. G. C. 3238a.

11. 43. Flat Foot.—Dissection of the foregoing foot—in spirit.

It will be seen that the head of the astragalus has slipped down from its proper place, and has carried the scaphoid with it. Considerable portions of the upper and inner facettes for articulation with the tibia have escaped from their contact with the tibia, while the cartilaginous area on the head, usually supported by the calcaneo-scaphoid ligament, is relatively much larger than usual. The tubercle of the scaphoid must have pressed through its covering of soft parts on to the ground.

G. C. 3238.

Presented by HENRY D. LITTLEJOHN, F.R.C.S.E., **1891.**

11. 44. Normal Foot.—A normal left foot dissected in a way similar to the last to act as a standard for comparison with it.

G. C. 3590.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

Miscellaneous Deformities.

11. 45. Deformity due to Spastic Paralysis.—Plaster cast of the left foot of a lady, illustrating the above.

For 20 years she had suffered from cerebral symptoms, *i.e.* giddiness, occasional falling, afterwards aphasia and gradual sinking. For 10 years before death she had suffered from spastic paralysis of the lower limbs. At the *post-mortem* examination a tumour (psammoma) was found opposite the internal auditory meatus on one side.

The foot as a whole and the great toe are extended, and the four outer toes are flexed. G. C. 3412.

Presented by T. BURN MURDOCH, M.B., **1892.**

11. 46. Bunion.—Plaster of Paris cast of a left foot, illustrating the above.

The great toe points obliquely upwards and outwards.

The metatarsal bone is directed downwards and inwards, and the two form an angle at the metatarsal phalangeal joint, which is itself considerably enlarged and projects inwards.

G. C. 3519.

11. 47. Knock-knee and Talipes Varus.—Bones forming the skeleton of the lower limbs of an elderly person—macerated, illustrating the above.

The deformity has been much more pronounced on the left side.

The upper ends of both femora show similar changes. The angle of the neck approaches a right angle in each case. The shaft is unusually straight, and a ridge of bone is prolonged from the spiral line along the inner side. The articular surfaces are normal. On the left side the shaft from the junction of the middle and lower thirds downwards has the appearance of having been bent outwards, and the inner condyle has projected markedly downwards. Part of the surface of the inner condyle has been injured in the process of maceration, but enough remains to show that its contour has been rounded. The contour of the outer condyle, on the other hand, is flat, as if the bone had been compressed. The articular surface of the outer condyle is irregular, and the margins show an overgrowth of bone, such as is seen in arthritis deformans. This latter change is seen also on the lower end of the right femur, which, however, may otherwise be considered as normal.

The tibiæ, and especially the left, are both altered towards the upper end by a twisting of the head of the bone inwards upon the shaft. In addition, on the left side the outer tuberosity has sunk markedly down, and the articular margins have irregular projections. The upper part of the shaft is distorted by an apparent flattening from before backwards.

The fibulæ have been bent forward at the lower end, and twisted with the tibia at the upper. The margins of the outer maleoli are irregular, and the grooves for the

peroneus longus tendons are filled up. Both feet, but especially the left, have been in a condition of talipes varus. On the outer side of the os calcis the groove for the peroneus longus is unduly prominent, especially on the right side, where new bone has been formed round it.

The whole of the bones, but especially those of the left side, are light, soft, and greasy. G. C. 3489.

Presented by A. Miles, F.R.C.S.E., **1893.**

11. 48. Genu-Valgum.—Left femur of an adult—macerated, illustrating the above.

The bone has been mounted in a nearly vertical position. The inner condyle is relatively much lower than the outer. The increased quantity of bone on the inside is apparently just above the condyle. The centre of the articular surface of the condyle is similar. The upper end of the shaft is flattened from before backwards, and a strong ridge leads down from the neck along the inner side of the shaft. The neck itself is unusually horizontal. B. C. I. I. M. 21.

11. 49. Hammer Toe.—Toe and section of a toe—in spirit, illustrating the above.

Both are in the condition known as hammer toe. The first inter-phalangeal joint is strongly flexed, and the other is extended. The head of the first phalanx is exposed, and the skin over it has been irritated by the pressure of the boot. The distal end of the soft parts of the toe is greatly enlarged in each case. G. C. 3243.

Presented by A. G. Miller, F.R.C.S.E., **1891.**

11. 50. Elephantiasis of Leg.—Plaster cast of the left foot and part of leg of a negro, affected with elephantiasis.

The limb has been so enormously swollen, and the skin has become so thick and rough, that the appearance of a human foot

is lost; and the aptness of the term "elephantiasis" is at once felt. The cast resembles the foot of an elephant much more than that of a man. G. C. 1821.

Presented by Dr Robertson, August **1836.**

11. 51. Elephantiasis of Leg.—Foot from which the previous cast was taken—in spirit. No number was attached to this specimen, but it is evidently the one from which the foregoing cast has been taken.

The papillæ of the skin of the foot are much exaggerated.

The swelling has in many places been apparently due to œdema, for the skin can be pressed down upon the deeper parts as if it were an indiarubber ball. The papillæ of the skin of the foot, except on that part of the sole which has borne pressure, are much exaggerated, and stand out individually as on a carnivorous animal's tongue. The bones of the leg where sawn across seem quite natural, without any appearance of enlargement. The substance of the muscles is opened out, as if traversed by numerous channels. G. C. 1821a.

Dupuytren's Contraction of the Palmar Fascia.

11. 52. Dupuytren's Contraction.—Plaster of Paris cast of a right hand—illustrating the above.

The subject was a man 65 years of age, alcoholic and gouty, but without having had any acute attack of gout. The condition was present for thirty or forty years, and was supposed to have been caused by hard delving in Ceylon. He declined any operation.

The cast shows a drawing down, especially of the middle finger, and a ridge formed by the thickened fasciæ, where it has been stretched. The thumb is also partly drawn down.

G. C. 3403.

Presented by T. Burn Murdoch, M.B., **1892.**

11. 53. Dupuytren's Contraction.—Plaster of Paris cast of the left hand of the same patient as the last was taken from.

The third and little fingers are flexed completely, and could only be moved a short distance from the hand. The thumb also is somewhat flexed at the first joint. G. C. 3404.

Presented by T. Burn Murdoch, M.B., **1892.**

11. 54. Dupuytren's Contraction.—Photograph of a right hand, showing a marked contraction of the third and little fingers, before operation.

The patient was an alcoholic man, aged 48. The condition, which had grown gradually worse, had existed for fifteen or twenty years, and was supposed to have been due to lifting 56 lbs. weights in a sugar refinery. At first there was acute pain during the beginning of the flexion, but this passed away, and latterly there was no pain. The hands, however, were useless for manual work.

G. C. 3405.

Presented by T. Burn Murdoch, M.B., **1892.**

11. 55. Dupuytren's Contraction.—Plaster of Paris cast of the hand shown in the previous case after the operation by division of the bands and stretching.

It shows a marked improvement in both the affected fingers. G. C. 3406.

Presented by T. Burn Murdoch, M.B., **1892.**

11. 56. Dupuytren's Contraction.—Plaster of Paris cast of the left hand of the same patient, illustrating the above.

There has been a slight contraction of the middle finger, and marked contraction of the ring and little fingers. There is a slight formation of a band on the palm, due to contraction of the fascia. G. C. 3407.

Presented by T. Burn Murdoch, M.B., **1892.**

11. 57. Clubbing of the Ends of the Fingers.—Plaster cast of a left hand, illustrating the above.

There is an enlargement of the last phalanges, and an almond-shape of the nails. This is often associated with a tendency to consumption. G. C. 3067.

Presented by BRYAN C. WALLER, M.D., **1889.**

11. 58. Tubercular Dactylitis. — Gelatine and glycerine cast of the finger of a child, amputated for strumous dactylitis.

The child had previously suffered amputation of the foot for tubercular disease.

The disease was found to be confined to the soft parts, although frequently it is in the bone. G. C. 2791.

Presented by P. H. MACLAREN, F.R.C.S.E., **1888.**

11. 59. Tubercular Dactylitis.—Section of the finger of a child, which was amputated for the above—in spirit.

In this case the shaft of the first phalanx is entirely replaced by a caseous mass. Another similar mass has lain beneath the skin on the palmar aspect. G. C. 3591.

Presented by C. A. STURROCK, F.R.C.S.E., **1893.**

GANGRENE.

a. Dry Senile Gangrene—from Arterial Disease.

11. 60. Dry Senile Gangrene of Foot—Early Stage.—Cast in gelatine and glycerine of the outer side of a left foot, to illustrate the above.

A red discolouration has extended up to the ankle, while the toes and sole of the foot have begun to turn black.

G. C. 2852.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1888.**

11. 61. Dry Senile Gangrene of Foot—Early Stage.—Foot and leg of the previous case dissected, so as to show the state of the blood-vessels—in spirit.

Both the anterior and posterior tibial arteries are atheromatous. Their coats are thickened and infiltrated with calcareous matter. Their lumen is diminished, especially that of the posterior tibial and its peroneal branch, and a portion of the posterior tibial artery is completely blocked with clot. The veins accompanying the peroneal artery are completely thrombosed, and patches of thrombosis can be seen in the posterior tibial veins. G. C. 2851.

Presented by Alexander Bruce, M.D., 1888.

11. 62. Dry Senile Gangrene of Leg and Foot.—Left foot and part of the bones of the leg of an adult, dried, showing the results of dry gangrene.

The man died of gangrene of the feet.

The foot is shrivelled and black, and the posterior tibial vessels are by their irregularity evidently atheromatous and studded with calcareous particles. The bones have been sawn across. G. C. 354.

Presented by Professor J. W. Turner.

11. 63. Blocked Vessels, which caused Dry Senile Gangrene.—The femoral artery, with its deep branch, from the same patient as the last was obtained from. The arteries have been slit up—in spirit.

The coats are thickened all over, and deposits of blood clot here and there have obstructed the lumen. The cross section of the profunda shows a complete blockage.

G. C. 351.

11. 64. Dry Senile Gangrene of Leg and Foot—Spontane-

ous Separation.—Lower portion of a left leg and foot—in spirit, illustrating the above.

The patient was a very stout old woman, aged 78. She had shown premonitory symptoms in both legs, *i.e.* cramps, pain and coldness, which were thought, at first, to be due to gout.

The gangrene began in the great toe, and gradually spread up the leg until it came just below the head of the fibula, where a line of demarcation was found. Amputation was not performed owing to the patient having advanced heart and kidney disease. The dead soft tissues were therefore cut through just below the line of demarcation, and an ineffectual attempt was made to destroy the bone by nitric and hydro-chloric acids. However, a month afterwards, the leg separated spontaneously. The stump healed over after a small fragment of dead bone had separated, and she went about on crutches and died 18 months afterwards of apoplexy.

The soft parts are shrivelled and discoloured. The upper ends of the bones are irregular and rough, owing to the natural mode of separation by granulations. G. C. 3167.

Presented by Dickinson Leigh, M.D., **1890.**

11. 65. Dry Senile Gangrene of Leg and Foot.—Lower portion of a left leg and foot—dried, illustrating the above.

The soft parts separated spontaneously, but the bones were sawn through. The patient recovered.

The specimen has the characteristic black and shrivelled appearance. The bones have been sawn across.

Presented by Professor J. W. Turner.

11. 66. Dry Senile Gangrene of Foot.—Greater part of a right foot—dried, illustrating the above.

The separation has evidently taken place through the tarsus. The specimen has the characteristic black and shrivelled appearance. F. P. C. 1207.

Presented by Professor John Thomson.

11. 67. Dry Senile Gangrene of Fingers.—Right hand—in spirit, illustrating the above.

The fingers have been gangrenous in each case from the proximal end of the second phalanx onwards. A line of demarcation has formed, and the process of separation has been in progress. The arteries have been injected, and some colouring matter can be seen in the cross section of both the radial and the ulnar artery. G. C. 95.

11. 68. Dry Senile Gangrene of Fingers.—Left hand—injected and in spirit, illustrating the above.

Portions of the fingers and of the thumb have been gangrenous. The distal ends of the second phalanges of the fingers and the shrivelled end of the thumb project from the soft parts.

A line of demarcation has formed upon the soft parts, but the bones had evidently not had time to separate. The end of the thumb was evidently about to separate at the joint. The injection has entered freely into the proximal ends of the fingers. G. C. 96.

11. 69. Dry Senile Gangrene of Hand.—Half-closed right hand, dried and varnished, illustrating the above.

It is mummified, and of a brownish black colour.

B. C. 4. 1. M. 7.

b. Moist Senile Gangrene.

11. 70. Advancing Moist Senile Gangrene of Foot.—A left leg and foot—dissected, and in spirit, illustrating the above.

The patient, a woman aged 62, was admitted to Mr Miller's Ward, Royal Infirmary, Edinburgh, on 4th November 1889, suffering from moist gangrene of the left great toe which was advancing up the foot. A month before, while paring the great toe nail of the left foot, she had accidentally cut the toe. The wound inflamed and suppurated. She had severe pain in the foot, which was treated without benefit by poultices. After three weeks the pain gradually diminished and disappeared. The foot, however, got cold and black. On November 7th the leg was amputated above the knee, and on the 9th she died.

The discoloured and sloughy condition of the great toe is well seen, but the discolouration which existed upon the other toes and on the dorsum of the foot has been removed by the spirit.

The arteries were injected with vermilion and tallow. The injection has run down the anterior tibial artery as far as the dorsum of the foot, but beyond that only a little has been able to penetrate. The coat of the anterior tibial artery is atheromatous and filled with calcareous plates the whole way. On the posterior aspect, the injection has penetrated only to the level of the upper third of the leg, in the posterior tibial artery, and to about the middle of the leg in the peroneal artery. Beyond these points both vessels are so much contracted that the injection could not flow in them. Their coats are studded with calcareous plates in a manner very similar to that found in the anterior tibial artery. It may be noted, moreover, that the parts near the anterior tibial artery have received the injection down to, although not beyond, the ankle, whereas the injection posteriorly has only reached as far as the middle of the calf. G. C. 3148.

Presented by A. G. MILLER, F.R.C.S.E., **1890.**

11. 71. Advancing Moist Senile Gangrene of Foot.—Left foot and greater part of a leg, blood-vessels dissected—in spirit, illustrating the above.

The patient was a man, aged 70. The condition began in the great toe, and it was amputated. The mischief returned, and he had a slowly increasing septic absorption from inflammation and suppuration of the foot, with great pain and sleeplessness. The leg was amputated below the knee, but the patient died three or four days afterwards. There was little or no bleeding from the vessels at the operation, probably because they were blocked near the bifurcation of the popliteal artery.

On dissecting out the arteries, the posterior tibial was found to be obliterated at its upper end by what seems to have been an old-standing clot, now apparently incorporated with the walls of the vessel. Below that point the vessel has

shrunk, but its lumen is still recognisable. The vessel wall throughout its whole extent is infiltrated with calcareous particles. The peroneal artery is likewise obliterated at its upper part, but the clot seems more recent. Lower down the condition of this vessel is similar to that of the posterior tibial artery. The veins were found empty and are nowhere thrombosed. The anterior tibial artery is obliterated at its upper part, while lower down its lumen is contracted and is in places obliterated. The gangrenous and sloughing state of the forepart of the foot is well shown. The great toe was amputated at a previous operation. G. C. 3377.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1892.**

11. 72. Moist Senile Gangrene of the Foot and Leg.—Lower part of a left leg and part of foot, blood-vessels dissected—in spirit, illustrating the above. The forepart of the foot was removed for convenience in mounting the specimen.

The patient, a woman aged 68, had a history of gradually increasing debility for a year, but with no premonitory symptoms of gangrene in the limb. A severe pain in the left foot and lower half of the left leg occurred suddenly, four months before her admission to the infirmary. Three days later the foot grew cold. The pain increased, and discolouration of the parts began. The latter gradually increased, but the pain subsided. There was no known cause for the onset of the disease. The leg was amputated, and the patient made a good recovery.

The posterior tibial artery is completely blocked at its upper part by a firm clot, which has apparently become adherent to the walls. The blocking continues down to about where the peroneal artery is given off. The continuation of the posterior tibial artery was accidentally removed in dissecting the specimen, but a small portion left at the upper end shows the vessel to have been greatly contracted. Its coat is thin, and only a few particles of lime salts can be felt upon it. The peroneal artery, although the larger of the two, is small and contracted, and its interior is occupied by a fine clot. Its coat also is only slightly thickened, and contains but few calcareous particles.

The posterior tibial vein at its upper part seems to have been thrombosed during life. The anterior tibial artery is somewhat contracted; its coat thickened, and contains a few calcareous particles. In the interior there was a loose clot in many places.

The discoloured gangrenous portion is separated from the rest of the leg by a line of demarcation. The tissues in the gangrenous part are soft and oily from degeneration, while those in the upper part are dry and free from oil and fat.

This seems to have been a case of embolus of the artery rather than of thrombosis. G. C. 3147.

Presented by A. G. MILLER, F.R.C.S.E., 1890.

11. 73. Moist Senile Gangrene of Foot — Separated.— Gangrenous foot of an adult—in spirit, illustrating the above.

The sloughy condition of the specimen is well shown. It is still discoloured, although much of the colour must have been bleached by the spirit. The foot has separated at the ankle joint. G. C. 2712.

Presented by WILLIAM NEWBIGGING, F.R.C.S.E.

11. 74. Moist Senile Gangrene of Hand and Forearm.—Left hand and forearm—in spirit, partially dissected to illustrate the above.

The patient, a woman aged 79 years, was an inmate of a workhouse. The medical attendant's report was as follows :—

"She had fatty degeneration of the heart's muscle, and extensive atheromatous disease of blood-vessels, and occasionally had fits of an epileptic character, due, I think, to localised brain softening. Her last illness dated from July 23rd, when she fell over the bed while asleep, and sustained an injury to the left arm. The trouble began in the fingers, and spread gradually to the hand and arm, assuming all the appearances of moist gangrene. She was comatose two or three days before death, which took place on 13th August 1888." The arm was decomposing and putrid during life.

The tissues in the gangrenous part are oily and soft from decomposition.

The brachial artery, when laid open, was found to be atheromatous, and at its bifurcation had fibrinous clots, which partly obstructed its lumen. The upper part of the ulnar artery was patent, though atheromatous, but in the upper end of the radial artery a firm clot completely occluded about an inch of the lumen. On the radial side of the limb the gangrene extends higher than in the ulnar side. Moreover, on the radial side, and posteriorly, the line of demarcation is complete; while on the ulnar side, and anteriorly, it is incomplete. These differences on the two sides may be associated with the difference in the patency of the respective arteries. Attention is directed to the important parts of the arteries by means of blue rods.

This specimen may be taken as an illustration of what is probably always the case in moist senile gangrene, *i.e.*, that besides a greatly impaired condition of the local circulation, there is a septic fermentation in the tissues. On this account, so long as any circulation remains, it is in a condition of inflammation. The tissues, moreover, which from their impaired nutrition were unable to resist the entrance of sepsis, soon die after it has been established. Thus an area of septic inflammation once begun rapidly advances and soon ends in gangrene. By the time the process has passed through the region whose circulation has primarily been impaired, the patient may have sunk from septic absorption, or the even previously well-nourished tissues may have become hopelessly saturated with decomposing fluids from the part beyond. The general symptoms of moist senile gangrene may be traced to septic absorption and pain. G. C. 2792.

Presented by G. M. Johnston, M.D., **1888.**

Other Forms of Gangrene.

11. 75. Gangrene from Constriction.—Left leg and gangrenous foot of a child—in spirit, illustrating the above.

The foot and leg had been put up in plaster of Paris. After several weeks the child was brought back, and when the plaster case was removed

the foot dropped out. The leg was afterwards amputated below the knee.

The foot had become gangrenous from constriction, and had separated by natural processes at the lower epiphyseal lines of the tibia and fibula. G. C. 3140.

Presented by MACDONALD BROWN, F.R.C.S.E., **1890.**

11. 76. Traumatic Gangrene, uncomplicated by Sepsis. —Little finger—in spirit, illustrating the above.

The patient was a mill girl, whose hand had been severely crushed by machinery.

The injured hand was treated by immersion in an antiseptic bath, and septic fermentation was entirely obviated. The finger was removed several days after the injury by clipping through some remaining tags of skin and tendon.

G. C. 3102.

Presented by D. A. CARRUTHERS, M.D., **1888.**

11. 77. Traumatic Gangrene, complicated by Sepsis.— Gelatine and glycerine cast of a right leg and foot, illustrating the above.

The patient, a strong labourer, had his foot crushed by the fall of a heavy stone, and he was admitted to the Royal Infirmary, Edinburgh, on the same night. The next morning the foot was cold, and gangrene was feared. By the fourth morning after the accident, gangrene of the foot had become pronounced, and as it seemed to be spreading up the leg, amputation was performed above the knee. The patient made a good recovery.

The tissues in the foot were decomposing. The posterior tibial artery was found to be ruptured, the soft parts much bruised, and the os calcis crushed, while there was a severe Pott's fracture of the fibula with wrenching off of the inner malleolus. See No. 3, 313.

The cast shows the discolouration of the foot, the blebs which appeared, and the peeling off of the epidermis. Above the ankle there were several blebs and much discolouration. This, it was feared, showed advancing gangrene, but it may have been due only to extensive extravasation. G. C. 2850.

Presented by CHARLES W. CATHCART, F.R.C.S.E.

11. 78. Gangrene from Frost Bite. — Forepart of foot in which the toes have been killed by exposure to cold—in spirit.

The line of separation, formed by ulceration, is complete in the skin, and is in progress in the deeper tissues. Some portions of the extensor tendons still remain on the dorsum. The metatarso-phalangeal joint of the great toe is exposed, and the head of the first metatarsal bone is bare, and has probably been in process of separation. The toes are apparently but little changed. They had probably been killed outright, and had not had time to shrivel and dry up. G. C. 225.

11. 79. Gangrene from Burn. — Forefinger injected and in spirit, illustrating the above.

From an old man who had fallen into the fire and burned his hand severely.

The end of the finger is gangrenous, and the parts behind, which were living, have inflamed and ulcerated, and have thus formed a line of demarcation. G. C. 2861.

Presented by A. G. Miller, F.R.C.S.E., **1888.**

11. 80. Gangrene from Acute Septic Poisoning. — Little finger—in spirit, illustrating the above.

From the hand of a workman, aged 50, who had received a severe cut of his thumb. The wound having become septic, inflammation spread over the whole hand and up the forearm, and ended in extensive suppuration and sloughing, with gangrene of this finger. It became shrivelled and dry before it was removed.

The ligaments at the meta-carpo phalangeal joint had been destroyed. Granulations have eroded the surface of the proximal end of the first phalanx. G. C. 3156.

Presented by Charles W. Cathcart, F.R.C.S.E., **1890.**

11. 81. Intra-uterine Gangrene, with Spontaneous Am-

putation.—Infant's right forearm and part of the upper arm—in spirit, illustrating the above.

It was hanging by a thread at birth, and was separated by a snip with scissors, without bleeding. No cause for the condition could be traced in the arrangement of the umbilical cord or otherwise. The infant was one of triplets.

A process of intra-uterine mummification seems to have extended nearly to the elbow. G. C. 2833.

Presented by G. M. JOHNSTON, M.D., **1888.**

Stumps after Amputation.

a. Anatomy.

11. 82. Stump after Amputation through the Upper Arm.—Stump after the above—dissected and in spirit.

George M——, aged 26, had his arm crushed by a stone weighing about 30 cwt., which was lowered too rapidly while he was smoothing the mortar for its bed. The forearm and elbow-joint were severely injured. A local doctor bandaged the arm, and the patient arrived at the Royal Infirmary, Edinburgh, at about 7 P.M. on 19th August 1890. Mr Cathcart amputated the limb 3½ or 4 inches above the condyles. About 1st September, when the wound was nearly healed, the patient showed signs of tetanus. On the morning of September 3rd Mr Cathcart performed Spence's amputation at the shoulder-joint. The tetanic spasms, which had been very severe, improved for a time, and the patient fell asleep at 1 P.M. He woke, however, at 1.45 P.M., and after three spasms, died in a fourth, which was prolonged.

The end of the median nerve is slightly enlarged, the end of the brachial artery has been filled by a clot, and its termination has been surrounded by organising lymph. The wound had almost entirely healed, and the section shows how the skin had covered in the cut end of the muscle.

G. C. 3204.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1890.**

11. 83. Stump after Amputation above the Elbow.—Stump

of a left arm after the above, injected with coarse injection and dissected—in spirit.

This amputation was performed for epithelioma of the hand and forearm. A second amputation, which was at the shoulder-joint, was performed nine weeks after the first, for a recurrence of the disease in the axillary glands. The man died soon after the second operation.

The brachial artery, which is injected, is seen to tail off into fibrous tissue (green rod) below its last branch. The calibre of the vessel is not much altered in the greater part of its course. The main nerves have apparently been shortened at the operation. The cut end of the median nerve is slightly bulbous, and a filament from it passes in front of the artery. The end of the ulnar nerve is only slightly enlarged. A rod is passed below the ends of both the ulnar and median nerves. The end of the musculo-spiral nerve is not enlarged. A thick pad of subcutaneous tissue covers the end of the bone, which has been sawn up. The fibres of the supinator radii longus muscle are seen to run into fibrous tissue below.

G. C. 2793.

Presented by Professor T. ANNANDALE, **1888.**

11. 84. Stump after Amputation at "the Seat of Election."—Sections of tibia and corresponding part of fibula of the above amputation—soft parts dissected, in spirit.

The amputation was performed for sarcoma of the leg, which had attacked an ulcer. There was no return at the stump, but the patient died of deposits of sarcoma in the brain, heart, and lungs.—See No. 9.66.

The end of the bone is covered by skin only. All the structures end in fibrous tissue. There are no enlargements of the ends of the nerves. G. C. 2817.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1888.**

11. 85. Stump after Syme's Amputation. — Section passing through tibia and fibula of an injected stump after a Syme's amputation.

An amputation through the leg was required for secondary hæmorrhage some weeks after the first one; the limb had been a paralysed one (see No. 6. 59.) The stump has healed well. The excellent covering for the bone afforded by the heel pad may be contrasted with that formed by the skin of the leg at the seat of election (previous specimen). G. C. 3173.

Presented by A. G. MILLER, F.R.C.S.E., **1890.**

11. 86. Stump after Syme's Amputation. — Parts from a recent case of Syme's Amputation—in spirit.

Reamputation was required on account of sloughing of the heel flap.

The posterior tibial artery was represented by only a very fine twig, and its place was taken by a large branch growing outwards from the posterior peroneal artery. Granulation tissue covers the end of both bones; and the periosteum above the section is thickened and has been forming bone. The end of the tendo-Achillis is seen to be covered with lymph. The cut end of the posterior tibial nerve is enlarged. G. C. 2802.

Presented by P. H. MACLAREN, F.R.C.S.E., **1888.**

11. 87. End of Bones after Syme's Amputation.—Portions of the tibia and fibula from the above case—macerated.

New bone is seen to be forming on the cut surface of the tibia and on the surface of the shaft of both bones.

G. C. 2802. a.

Presented by P. H. MACLAREN, F.R.C.S.E., **1888.**

11. 88. Stump after a Syme or Pirogoff's Amputation.—Knee-joint and stump of the leg below—dissected, and in spirit, illustrating the above.

Syme or Pirogoff's amputation had been performed early in life. Re-amputation was performed above the knee for disease of the knee-joint.

The muscles are all atrophied, but the gastro-cnemius is the least so, and the soleus is next to it. The posterior tibial artery is smaller in proportion than the posterior tibial nerve, which has no bulbous ending. The os calcis has either been at first partly left, or has since been partly re-formed. The bone representing it is separated from the tibia, partly by fibrous tissue, and partly by a false joint. G. C. 2798.

Presented by Professor T. ANNANDALE, **1888.**

11. 89. Stump after a Syme or Pirogoff's Amputation.—Fibula and a small piece of the tibia, with a portion of the bone representing the os calcis, from the previous case—in spirit.

An atrophied tendo-Achillis is attached to a fragment of the os calcis, and between this bone and the bones of the leg there is an appearance of cartilage in the newly formed joint.

G. C. 2798. a:

Presented by Professor T. ANNANDALE, **1887.**

11. 90. Stump of a Femur a Year after Amputation.—Portion of the femur—macerated, illustrating the above.

The original operation was performed at the Military Hospital, at Portsea. Whether a secondary amputation was required, or whether the patient died from other causes, is uncertain, but from the appearance of the stump the latter seems more probable.

The end of the bone is somewhat rounded off, but the extremity has not been covered in. F. P. C. 229.

11. 91. Stump of a Femur long after Amputation.—Small piece of bone—macerated, illustrating the above.

The secondary amputation was performed on account of "irritable stump" (*i.e.* enlargement and painful condition of the ends of the nerves).

The bone is greatly atrophied, and its extremity rounded

and tapered off. The linea aspera projects at the back, and its prominence is probably due to its having had muscles attached to it, which remained in use. B. C. 1. 5. M. 48.

11. 92. Stump of Radius long after Amputation. — Upper two-thirds of a radius—macerated, illustrating the above.

The bone is light, and the muscular ridges are feebly developed. The extremity is rounded off, but covered with a slight crust of new periosteal bone, which extends a little way up the shaft. B. C. 1. 5. M. 45.

11. 93. Stump of a Phalanx after Amputation.—First and part of second phalanx of a finger—macerated, illustrating the above.

The piece of bone at the end of the phalanx seems to be the atrophied stump of the second phalanx, after amputation. G. C. 3313.

b. Diseases in Stumps—Septic Changes.

11. 94. Stump of a Fibula which has been Inflamed.—Section of portion of a fibula—macerated, illustrating the above.

The distal end of the bone has evidently been sawn across. New periosteal bone has formed for some distance above the lower end. The interior of the inflamed part is now filled with adipocere. B. C. 1. 5. M. 21.

11. 95. Stump of the Bones of a Leg after Amputation Thickened.—Portion of a right tibia and fibula—macerated, illustrating the above.

Both bones are considerably thickened, and some new periosteal bone has been formed for some distance up the shaft of

each, especially upon the tibia. A firm mass of bone unites their distal ends together.

Possibly this condition has been due to a chronic ulcer on face of the stump. B. C. 1. 5. M. 43.

11. 96. Stump of a Femur, with Necrosis and Thickening.—Section of the injected stump of a femur—macerated, illustrating the above.

A small necrosed fragment at the end has been in process of separation, and a strong crust of new bone has been formed round the sawn extremity. W. C. G. 22.

11. 97. Stump of a Femur after Amputation. — Section of the injected stump of a femur—in spirit, illustrating the above.

Round the sawn extremity there is a considerable crust of bone, which extends for some distance up the shaft, while new bone has been forming across the end of the medullary cavity. The vascularity of the new bone is well shown by the injection.

The large amount of new bone has, no doubt, been due to septic inflammation of the soft parts over the bone.

B. C. 1. 5. M. 44.

11. 98. Stump of a Femur, altered by Chronic Septic Osteo-myelitis.—Enlarged end of a femur after amputation—macerated, illustrating the above.

The lower end is rounded in shape, but its surface is irregular and is covered by a spongy carious bone. The whole shaft is greatly thickened. The original compact tissue cannot be traced. The wall of the medullary cavity is formed of bone, which is intermediate in character between cancellous and compact tissue. It is of irregular thickness. W. C. G. 23.

11. 99. Stump of a Syme's Amputation, affected by Tuberculosis.—Section of the tibia and soft parts of a left leg—injected with carmine, and in spirit, illustrating the above.

The foot was amputated for tubercular disease of the ankle-joint. A re-amputation became necessary on account of return of the disease in the bone and soft parts.

In the heel flap is seen a large abscess cavity, lined by granulations. In the interior of the tibia a condition of chronic tubercular osteo-myelitis tending to caseation is seen to have spread upwards from the sawn surface.

G. C. 2872.

Presented by P. H. MacLaren, F.R.C.S.E., 1888.

Illustrations of the forms of Stumps.

11. 100. Stump of an Amputation at the Shoulder-joint.—Plaster of Paris cast of a healed stump after amputation at the shoulder-joint, showing the cicatrix at the side of the chest.

G. C. 3520.

11. 101. Stump of an Amputation at the Shoulder-joint.—Plaster of Paris cast of a healed stump, after amputation at the shoulder-joint, showing the cicatrix at the side of the chest.

G. C. 3521.

11. 102. Stump of an Amputation through the First Phalanx of the Finger.—Gelatine and glycerine cast of a right hand—illustrating the above.

The patient was an old woman, whose third finger had been amputated through the first joint in early life.

The cast was taken in the extended position to show that the stump of the first phalanx extended equally with the other fingers. G. C. 2898.

Presented by Charles W. Cathcart, F.R.C.S.E., 1888.

11. 103. Stump of an Amputation through the First Phalanx of the Finger.—Gelatine and glycerine cast of the foregoing hand in the flexed position. This cast shows that the stump of the first phalanx flexed equally with the other fingers. G. C. 2897.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1888.**

11. 104. Stump after Chopart's Amputation.—Plaster of Paris cast of a stump of a right foot, after the above operation.

The cast shows that the heel has not been drawn up, and that the sole has been planted well on the ground. The arch of the foot has necessarily given way, but an admirable basis of support has been left, much better than that afforded by Syme's amputation. G. C. 3527.

Presented by CHARLES W. CATHCART, F.R.C.S.E., **1893.**

PRINTED AT THE EDINBURGH PRESS, 9 AND 11 YOUNG STREET.

LIBRARY OF THE
PRESENTED BY
ERNEST HART Esq
BRITISH MEDICAL ASSOCIATION

UNIVERSITY
OF BRISTOL
MEDICINE