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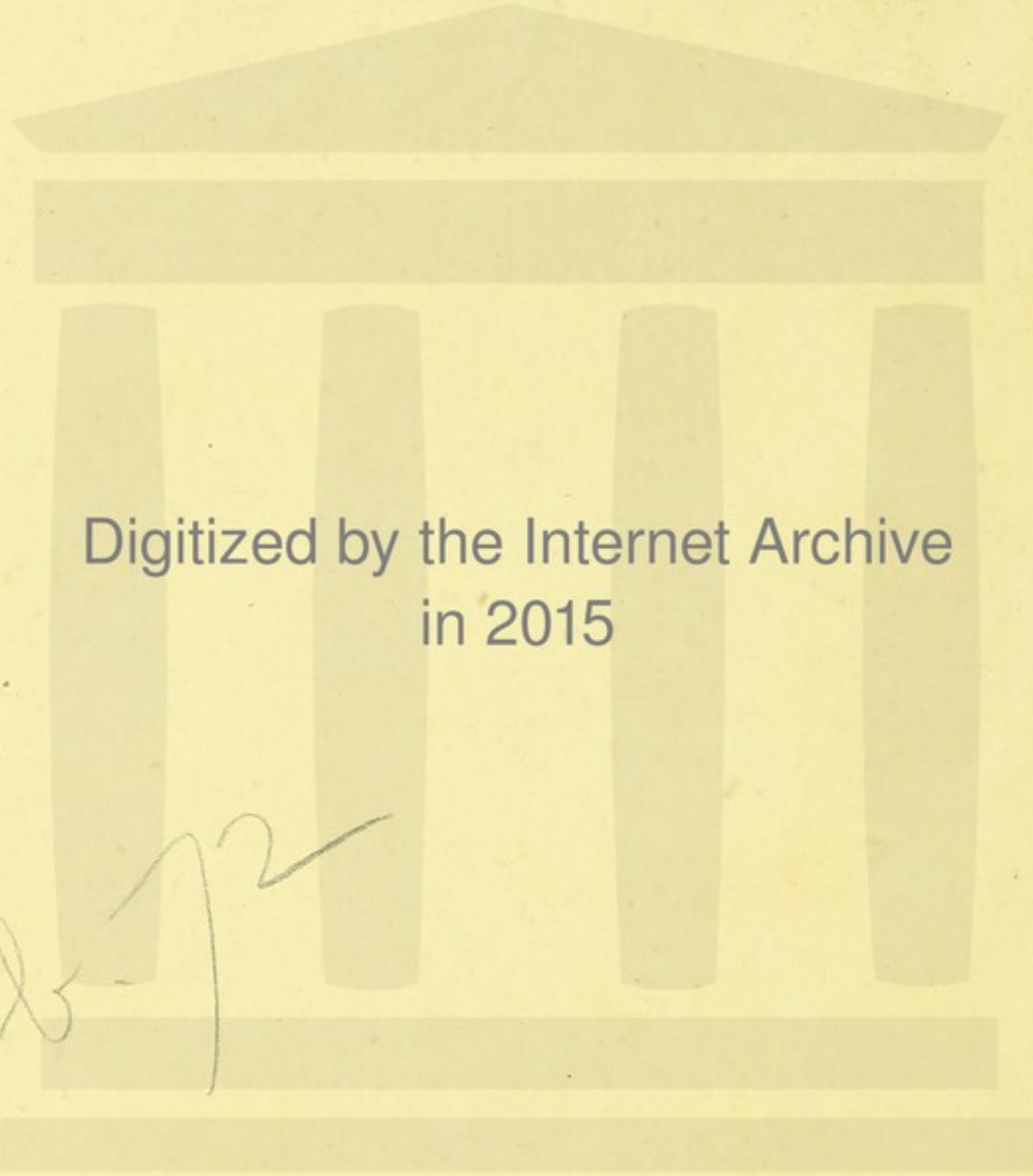
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from the Council of the College*

DESCRIPTIVE CATALOGUE
OF THE
PATHOLOGICAL SPECIMENS
CONTAINED IN
THE MUSEUM
OF
THE ROYAL COLLEGE OF SURGEONS
OF ENGLAND.

VOLUME II.
PATHOLOGY OF THE BLOOD, AND ORGANS OF
LOCOMOTION.



LONDON:
PRINTED BY WILLIAM CLOWES AND SONS,
DUKE STREET, STAMFORD STREET.

1847.

DESCRIPTIVE CATALOGUE

PATHOLOGICAL SPECIMENS

THE MUSEUM

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TABLE OF THE CONTENTS OF THE SECOND VOLUME.

	Page	Number
Series VII.—MORBID CONDITIONS OF THE BLOOD	1	
1. Clots formed of Blood drawn from the Body	1	321 to 325
2. Clots formed of Blood effused in the Body during life	2	326, 327
3. Clots formed in the Heart and Vessels after death	2	328 to 331
4. Clots formed in the Heart and Vessels during life	3	332 to 340
Series VIII.—INJURIES AND DISEASES OF MUSCLES	9	341 to 347
Series IX.—INJURIES AND DISEASES OF TENDONS	11	348 to 363
Series X.—DISEASES OF BURSEÆ, SHEATHS OF TENDONS, AND SIMILAR PARTS	13	
A.—Diseased Bursæ, Synovial Sheaths, &c.	13	364 to 368
B.—Loose Bodies removed from the same	14	369 to 376
Series XI.—INJURIES OF CARTILAGE	15	377, 378
Diseases of Cartilage referred to	15	
Series XII.—INJURIES AND DISEASES OF BONES:		
Sub-Series 1.—Hypertrophy	16	379, 380
Sub-Series 2.—Atrophy (including Fatty Degeneration, Rickets, and Mollities Ossium)	16	381 to 404
Sub-Series 3.—Section A.—Repair of Fractures in general	39	
a. The ordinary and simple process of the repair of Fractures	39	405 to 432
b. Structure of Callus	44	433 to 436
c. Deviations from the ordinary process	44	437 to 459
d. Fractures which have remained long unrepai red	50	460 to 470
e. Gun-shot, and other similar, injuries	55	471 to 479

	Page	Number
Series XII.		
Sub-Series 3.—Section B.—Fractures of Particular Bones :		
Bones of the Skull	57	480 to 484
Ribs	59	485, 486
Pelvis	59	487 to 490
Scapula and Clavicle	61	491 to 493
Humerus	61	494 to 497
Radius and Ulna	63	498 to 502
Bones of the Hand	65	503, 504
Femur	65	505 to 534
Patella	78	535 to 545
Tibia and Fibula	80	546 to 551
Sub-Series 4.—Section A.—Inflammation of Bone with formation of New Bone	82	552, 553
Sub-Section a.—With superficial formation of New Bone	83	554 to 592
Sub-Section b.—Inflammation producing ex- pansion of the Walls of a Bone, and sub- sequent induration	97	593 to 600
Sub-Section c. — Inflammation producing consolidation of cancellous tissue	103	601
Section B.—Inflammation with suppuration in bone	103	602, 603
Section C.—Inflammation with ulceration in bone	104	
Superficial ulceration	105	604 to 606
Ulceration of articular parts of bones	106	607 to 617
Carious ulceration	109	618 to 625
Rheumatic ulceration	111	626, 627, 627A
Syphilitic ulceration	112	628 to 637
Malignant ulceration	119	638 to 640
Sub-Series 5.—Necrosis	120	
Section A.—Necrosis in General	123	641 to 655
a. Separation of the Periosteum	126	656, 657
b. Formation of new bone	127	658 to 661
c. Formation of the Groove between the dead and living bone	128	662 to 675
d. Advanced formation of new bone	131	676
e. Changes in the dead bone	132	677, 678
f. Formation of new bone on por- tions of the old bone	132	679 to 686

	Page	Number
g. Necrosis of the middle or inner layers of the wall of a bone . . .	136	687, 688
h. Necrosis of cancellous tissue . . .	137	689 to 695
i. Necrosis of articular portions of bones	139	696 to 700
j. Necrosis of diseased bone . . .	140	701 to 705
k. Double Necrosis	141	706 to 709
l. Necrosis from peculiar causes . . .	143	710 to 715
Section B.—Necrosis of Particular Bones :		
Bones of the Skull	146	716 to 718
————— Face	149	719 to 724
Ribs	150	725, 726
Clavicle	150	728
Bones of the Arm and Hand	151	729 to 737
Femur	153	738 to 742
Tibia	156	743 to 755A
Fibula	160	756 to 758
Bones of the Foot	160	759 to 771
Sub-Series 6.—Tumours of Bones :		
1. Cartilaginous Tumours	164	772 to 781
2. Cartilaginous Tumour ossified :		
a. Cancellous and with Medulla	169	782 to 792
b. Compact and hard	171	793 to 796
c. Growths like osseous tumours	173	797 to 800
3. Fibrous Tumours	174	801 to 805
4. Osteoid Tumours	176	806 to 816
5. Hard Cancer	182	817 to 823
6. Medullary Cancer	184	824 to 852
7. Alveolar Cancer	197	853
8. Tubercle	197	854, 855
9. Bones altered by the Growth of Tumours	198	856 to 859
10. Various growths and deposits	200	860 to 862A
Sub-Series 7.—Entozoa in Bone	201	863, 864
Series XIII.—INJURIES AND DISEASES OF JOINTS :		
Sub-Series 1.—Dislocations by External Violence :		
Upper Extremity	202	865 to 878
Lower Extremity	208	879 to 884
Sub-Series 2.—Diseases	211	
Section A.—Diseases of the Synovial Membrane		
	212	885 to 899

	Page	Number
Section B.—Diseases of Articular Cartilages	215	900 to 927
Suppurative Disease of the Hip-Joint	225	928 to 941
Fibrous Degeneration of Articular Cartilage	231	942 to 951
Section C.—Tumours in Joints	234	952
Section D.—Pendulous and Loose Bodies in Joints	235	953 to 957
Section E.—Gouty Deposits in Joints	237	958 to 965
Section F.—Osseous Ankylosis	239	966 to 970
Section G.—Dislocation after Disease	241	971 to 974

Series XIV.—INJURIES AND DISEASES OF THE VERTEBRAL

COLUMN :

Atrophy	243	975, 976
Fracture and Dislocation	243	977 to 986
Ulceration	248	987 to 999
Necrosis	254	1000

DIVISION II.

SPECIAL PATHOLOGY.

SERIES VII.—MORBID CONDITIONS OF THE BLOOD.

1. *Clots formed of Blood drawn from the Body.*

321. Section of a clot of inflammatory blood, covered by a thick *buffy coat*, or layer of dense, tough, white fibrinous coagulum. The contraction of the buffy coat has made the clot concave on its upper surface, and smaller in circumference at this than at any other part. The outer and inferior portions of the coloured part of the clot are much darker than its interior.

From the Museum of George Langstaff, Esq.

322. A clot of blood with a thin buffy coat.

From the Museum of Sir A. P. Cooper.

323. Section of a similar clot, which also exhibits the concave cup-like depression and incurved edges of the buffy coat, and the dark exterior of the coloured part of the clot.

From the Museum of Sir A. P. Cooper.

324. A layer of colourless coagulum, or buffy coat, removed from the upper surface of a clot of inflammatory blood.

From the Museum of Sir A. P. Cooper.

325. A clot of blood with a thick and contracted buffy coat, to one of the margins of which films and shreds of colourless coagulum are attached. The lower part of the clot has been removed, showing the depth to which the buffy coat extends in it.

From the Museum of Sir A. P. Cooper.

2. *Clots formed of Blood effused in the Body during Life.*

326. A clot of blood about fifteen inches long, cylindrical and tortuous. It appears to have been formed in the small intestines; for a part of its surface is marked in circles, as if it had been moulded upon the valvulae conniventes.

Hunterian.

327. Sections of a large firm clot of blood, effused, eleven weeks before death, between the peritoneum and abdominal muscles, from a vessel wounded in *paracentesis abdominis*. It is of uniform firm consistence, shaded and mottled with various hues of brown, deep crimson, and black: it is exactly circumscribed, and in close contact with the muscle and peritoneum. The epigastric artery and all its branches around the clot were minutely injected, but no injection passed into the substance of the clot.

Presented by John Howship, Esq.

3. *Clots formed in the Heart and Vessels after Death.*

328. A single, continuous, and variously branched clot of blood from the right auricle and ventricle and the trunks and branches of the pulmonary artery and venae cavæ.

Hunterian.

329. A similar clot from the aorta and its branches in the same person.

“ The patient died of palpitations.”

Hunterian.

330. A finely branched clot of blood from the vessels of a horse. *Hunterian.*

331. Section of the right ventricle of a heart, with colourless coagulum adhering to its inner surface, and entangled in the meshes of its muscular fasciculi.
Hunterian.

4. *Clots formed in the Heart and Vessels during Life.*

332. A part of the left ventricle of a heart. The whole apex of its cavity is filled by two bodies (*Végétations globuleuses*, Laennec*), of which the larger is nearly two inches in length, and an inch in diameter, and the smaller about half that size. A section has been made through the wall of the heart into the larger body, and shows its exterior composed of firm fibrinous laminae, which form an irregular sac containing masses of soft fibrine. The portion of the wall of the ventricle to which this body is attached is rather thinner than natural, and appears soft and dilated.

The following is, in all probability, the account of the examination of the case :—

“ Mr. —, aged 61, died of apoplexy. On examining the brain I found everything externally to all appearance sound. On cutting off the upper part of the right hemisphere, I observed in the cortical substance on the right side (just above the middle lobe), where it was surrounding the medullary, and passing in between the convolutions of the medullary substance, that it was redder in its substance than common, full of red dots like cut ends of vessels, many of which were as large as a large pin's head, which were plainly extravasations. The substance, wherever these were, was tender and pulpy, breaking down upon turning off the pia-mater, which was not the case with the other parts of the brain that had not this appearance. None of this redness or dottedness was continued into the medullary substance. A very small degree of this appearance was observable on the left side, near about the same place. The ventricles contained about three spoonfuls of water; none in the third or fourth ventricle. The medullary substance over the anterior lobe of the right side was tender, softer, and more ropy than any other part of the brain; it would hardly allow of being cut with the knife.

* “*Traité de l'Auscultation Médiate.*” Paris, 1837. T. iii., p. 344.

" On opening the thorax, I found some adhesions of the lungs of the left side, and on cutting into the pericardium, I observed that it adhered to the heart on the left side by a glutinous adhesion, which was easily separated. The heart seemed everywhere sound, excepting one part of the left ventricle: viz., on its fore part, close to the septum, where there was a gentle rising, and a kind of discoloration. On feeling this, there was a plain fluctuation. When I cut into the right ventricle I found the coronary artery, as it passes between the auricle and ventricle, ossified. A large polypus in the right auricle, which extended into the veins, both above and below. This polypus was buff on the upper part through its whole extent, and dark below, which shows its time of forming. The same kind in the ventricle and pulmonary artery. I cut into the left ventricle, where it was sound, to expose its inside; and observed a solid coagulum of blood of an oval figure, opposite to the swelling on the external surface; this coagulum was of old standing from its appearance, and was firmly entangled in the fasciculi of the ventricle. I also could feel a plain fluctuation in it, and which communicated with the external fluctuation. I cut into the swelling externally, and got into a cavity which was in the substance of the heart, and which also communicated with the cavity in the coagulum. These cavities contained a bloody matter.

" The heart at this part must have lost its proper action, which gave an opportunity to the coagulable lymph to coagulate here. An abscess formed in the substance of the ventricle; this abscess came in contact with the polypus, and dissolved part of it, which, mixing with the matter of the abscess, gave it its red colour, but it was prevented from bursting into the cavity of the ventricle by the coagulum.

" The stomach was very much contracted, by its being very empty, from some vomitings he had before death." *—*Hunterian Manuscript; Account of the Dissections of Morbid Bodies*, p. 206.

333. The apex of a heart in which bodies of the same kind as those last described, but smaller and more numerous, are collected among the muscular fasciculi of both ventricles. The apex of the left ventricle, to the inner surface of which one of the largest bodies is attached, appears thin and partially white, as if indurated.

" *Of the appearances on opening the body of Colonel Graham.*

" On taking off the skull and dura-mater we found the cellular membrane of the pia

* There is so complete a similarity between this case and one published by Mr. Hewson, from Sir John Pringle's notes, that they probably both relate to the same examination. See "The Works of William Hewson:" Edited by George Gulliver, F.R.S.; for the Sydenham Society. London, 1846, p. 163.

mater everywhere on the upper part of the two hemispheres loaded with a very limpid water. On slicing off the upper part of the two hemispheres, and exposing the two lateral ventricles, we found them fuller of water than what is common in a perfect sound state; and also these cavities larger than common, so that the quantity of water might be three or four ounces, but perfectly clear. Some of the arteries of the pia mater were ossified in some parts, but not remarkably so. Every other part of the brain appeared to be perfectly sound.

“The lungs did not adhere in any part to the pleura excepting at their upper points. They appeared sound everywhere, excepting on the right side, [where] a part on the lower lobe was more dense than common, or even any other part of the same lungs: however, this appeared to be owing only to extravasated water in the cellular membrane of that part. The posterior part of the cavity of the chest on the same side was smeared over with red blood, but we saw no appearance of ruptured vessels. On examining the heart, we found, at the apex of the left ventricle, and for about an inch further on, that the substance was thinner, more flabby than usual, and of a more livid colour. Within the cavity, and near the apex, it was filled up with a substance for a considerable way. The surface of this, next to the cavity of the ventricle and circulating blood, was firm, like coagulated blood of long standing, in the centre of which was half coagulated blood. In many places between the fasciculi near the apex were a number of small bodies, as it were peeping through between them, which were of the same substance with the former.

“Something of the same kind we found in the right ventricle, which showed the nature of the disease better than the left. It would almost seem to be a circumscribed portion of blood entangled in the fasciculi of the ventricle: the outsides of it coagulating whilst the centre kept almost fluid, which formed a kind of cavity. The external surfaces of all of them were smooth and white, as if washed clean of the red blood, by the motion of the circulating blood. Perhaps after they were once formed, they accumulated by attaching the coagulable part of the blood as it was passing in and out of the heart. But how the blood could stagnate at the first is not easily explained: or was it an exudation of the coagulable lymph, as we find in other cavities, and even in the veins, where the blood is also in motion?

“The abdominal viscera appeared to be tolerably sound.”—*Hunterian Manuscript; Account of the Dissections of Morbid Bodies*, p. 256.

Parts of both the preceding cases are published by Mr. Thurnam in a paper “On Aneurisms of the Heart;” in the *Medico-Chirurgical Transactions*, vol. xxi., pp. 213, 215: and a part of No. 333 is represented in the same volume, pl. iii., fig. 2.

[In addition to the two preceding cases, the following are inserted, both because they perhaps belong to the preparations No. 328—329, and because they explain Mr. Hunter’s opinions, hitherto unpublished, on the nature and distinction of clots (or polypi, as they have been called) formed in the heart before and after death.]

“ *Palpitation of the Heart.* ”

“ Captain Harris has been troubled with a palpitation of the heart for some time, which came upon him when shut up in a dungeon in a French prison. It often leaves him and then he is very well ; but when he is attacked (which is very often), the heart beats extremely frequent, viz., 160 in a minute. The shock against the ribs is so strong as to be seen through his common clothes, and can easily be heard in a still room. This violent motion of the heart shakes the whole body, which is easily to be seen. While in one of these fits, which often lasts for weeks, he will be extremely cold, then hot, and then break out in a sweat. Sometimes the palpitation will leave him all at once, and then he is well, but will immediately return again. While in the fit a little thing fatigues him, and he breathes with great difficulty. Something seems to rise in his throat, and then his head is affected, and he feels as if going to expire. Surprise will sometimes bring it on, and another will often carry it off. Bleeding in the time of the fit is the only relief.”—*Hunterian MS. Cases in Medicine and Surgery*, p. 455.

“ May 1757.—With Doctor Pringle, I opened the body of Mr. Harris, a man about forty or upwards. His abdominal viscera were very sound, excepting the kidney on the left side, [which] was become white in some places. The right lobe of the lungs adhered everywhere to the ribs and sternum, excepting a little part on the posterior surface ; which space was filled with water, and was very likely the cause of the non-adherence of that part. The left lobe only adhered at the upper part ; and there was near half a pint of water in that side.

“ On opening the pericardium we found a little more water than usual in health. The heart was very large, and not very fat. On cutting into the right auricle, I found its coats very thick and muscular : and a large polypus, nearly filling the whole auricle, extended into the ventricle ; from thence into the pulmonary artery, and was continued into the two venæ cavæ. This polypus was white on the upper surface, and black on the under. In the veins it was not so firm, and blacker ; the same in the pulmonary artery ; became more and more so towards the extremities of the smaller ramifications ; and where the pulmonary valves were, there were plainly the marks of them on the polypus. On opening the left auricle, I found it stronger than usual, and a good deal of coagulated blood in it, not of the buff-colour, nor of that strength. The left ventricle towards the apex had a great many of the fasciculi become hard, callos, and white ; while the other parts were of their natural consistence and colour. At those white parts were entangled a great many pieces of coagulated blood, one of which was as large as a walnut. This whiteness is common to all muscles that have lost their action, let the cause be what it will : and this may be the case in other parts of the body, viz., the kidney. Those coagula were very different from those formed after death : the first had all the appearance of recent coagulated blood, after it has been taken from the body ; this had all the appearance that blood has in an aneurism, for it is irregular, and the colour is not higher on one side more than on the other, and is generally redder than the other polypus, which redness is of a darkish brown.

“ Now, as we see a great difference between these two polypi, one, we are certain, arises from want of action, and is like all other that are formed gradually, and from the want of action; while the other is like the settling of common blood after death; in every respect, is much more in quantity than we can expect, and takes on the forms of parts, as all blood quite at rest would. From these circumstances, I should think one was formed before death, the other after, or, at soonest, at the time of death; and as we see that blood, being left to rest, and only allowed to cool gradually, takes on more and more of the buff colour and consistence in proportion to these two circumstances; and this must be the case with the blood in a dead person: but why the blood should take on this appearance in the right ventricle more than the left, I do not pretend to say.”—*Hunterian Manuscript; Account of the Dissections of Morbid Bodies*, p. 33.

“ I opened a man at St. George’s Hospital. He was supposed to be consumptive, but was a little dropsical. His lungs were more solid than what is usual for that viscus in a sound state, but no partial disease or hardness, nor adhesions of any consequence. There was a good deal of liquor pericardii mixed with coagulable lymph. His heart was very large and white in its coats, somewhat like the flesh of veal. In the apex of the left ventricle there was a substance about the bigness of a pigeon’s egg, but more flat. Its detached surface was smooth, but a little uneven, like the external surface of the brain, was of a whitish cast, streaked with brown or red, and pulpy to the feel. When cut into, it proved to be softer in its middle than external surface, so that the external surface had formed a kind of coat. Its substance seemed to be half dissolved into a whitish brown fluid, of the consistence of cream. Cutting this was something like cutting into the udder of a cow that was giving milk, [in which] the milk is seen mixed a little with blood on the cut surface. I found that this substance was entirely separable from the substance of the heart, and only connected to it by being entangled in the fasciculi of that part. The parts of it that passed in between the fasciculi were firmer than what the body of the tumour was, and had the appearance of aneurismal blood. This substance, I do suppose, was originally blood; but whether formed from that blood which was within the cavity of the ventricle to be thrown out by the aorta; or whether an exudation of coagulable lymph from the substance of the heart at this part, is not easy to determine. If the first, this part of the heart must have been paralytic; but which ever way it was, it was not now sound blood; and its disease was that of blood. If I remember right, this substance had the same appearance with that substance found in the back of a young man described in a paper given in by Dr. Knox in the London Essays. I asked some of the pupils who had attended him before death, if he had had an irregular pulse for some time, and was answered in the affirmative.

“ This was one of the peripneumonics. Was not the dropsy owing to the disease in the lungs, and more especially to this kind?”—*Hunterian Manuscript; Account of the Dissections of Morbid Bodies*, p. 221.

334. Parts of a right femoral artery and vein from a patient in whom the right

leg mortified. The artery is completely filled with firm, round, dry, rust-coloured and adherent coagulum. The lower part of the vein is similarly filled, and in its upper part is a small flattened coagulum, apparently more recently formed. *Hunterian.*

335. The bifurcation of the aorta and part of the vena cava inferior from the same patient as the specimen last described. The right common and external iliac arteries are filled with the same kind of firm, round coagulum. The aorta and left iliac artery are healthy, but of small size. The vein also appears healthy. *Hunterian.*

“ Motion seems to retard coagulation;” yet we know for certain that blood will in time coagulate even in the vessels themselves, and under certain circumstances sooner, perhaps, than anywhere else; as, for instance, when there is a disposition to mortification. In this case we find the blood coagulated even in the larger vessels.

“ I have seen a mortification come on the foot and leg, and when it had advanced only to a certain degree, the patient died. On examining the parts above the mortified part, I found the crural and iliac arteries filled completely with strong coagulated blood: we may thence infer that the tendency to mortification in the vessels produced this disposition in the blood. If the coagulation should be supposed to have arisen from the blood being stopped in the large vessels at the mortified part, let us reflect that this cannot account for it; the same thing ought then to happen in an amputation, or in any case where the larger vessels are tied up.—*Hunter; On the Blood, &c.: Works*, vol. iii. p. 30.

^a This is motion given to it in a vessel, without any empty space, and having beads put into it, which are shaken.

336. Portion of an artery with a round firm clot of blood adhering to its walls. The internal coat of the artery is deeply wrinkled transversely, and a thin layer of lymph is attached to it. *Hunterian.*
337. Section of a large mass of laminated coagulum partially decolorized, from an aneurism of the aorta. *Hunterian.*
338. A large quantity of laminated coagulum from an aneurism in a lion. Its layers have been artificially separated. *Hunterian.*

339. Partially separated layers of coagulated and decolorized blood from the sac of an aneurism. *From the Museum of Sir A. P. Cooper.*

340. "A coagulum from an aneurism." [*Hunterian MS. Catalogue.*] It has not the usual laminated structure of the coagula formed in aneurismal sacs during life. *Hunterian.*

Specimens in other parts of the Museum relating to effusion, or to coagulation or other changes, of blood in the living body :—

Effusions of Blood ; In the substance of Organs ; Apoplexies :—

Pulmonary, 1780 to 1785.

Cerebral, 2046 to 2058.

„ „ On free surfaces, or in cavities, 1188-9, 2108-9, 2110, 2344 to 2350, 2460, 2541.

Clots in blood-vessels, 1580 to 1584, 1713-4-6, 1735 to 1741.

—— Aneurismal sacs, 1649, 1652-3-5-6, 1679, 1706 to 1711.

Organization of clots, 11 to 14, 76, 308, 309, 1732-3, 1742-3, 2107 to 2116.

Alterations of Blood by Chemical Action, 1142-3-4-6-7, 1190.

See also the Series of Injuries and Diseases of the Heart, Arteries, and Veins for additional illustrations of the Pathology of Blood.

SERIES VIII.—INJURIES AND DISEASES OF MUSCLES.

341. The lower part of a left *rectus abdominis* muscle, a portion of which was ruptured during spasmodic contraction in tetanus. The adjacent part of the muscle is retracted.

Presented by Thomas Blizard Curling, Esq.

The case is related by Mr. Curling in his 'Treatise on Tetanus,' London, 8vo., 1836, at p. 75 and p. 158.

342. A thumb blown from the hand by the explosion of gunpowder. The long flexor tendon, and one of the extensor tendons, have been pulled out from their muscles, retaining their attachments to the bones, and having portions of muscular fibres connected with them.

From the Museum of Robert Liston, Esq.

343. Part of a *gastrocnemius* muscle, from a case of club-foot. The muscular tissue cannot be discerned; its place is occupied by fat, the particles of which present traces of a linear arrangement.

From the Museum of Sir A. P. Cooper.

344. "The texture of muscles destroyed by the extravasation of coagulable lymph" [*Hunterian MS. Catalogue*]. The muscle, apparently a part of the *soleus*, has nearly lost its fibrous aspect; its surface has a greyish hue, and its tissues appear consolidated. *Hunterian.*

345. Portion of a pectoral muscle in which are several distinct, small, oval, hard, and white carcinomatous tumours. The fasciculi of the muscle, among which they are imbedded, appear healthy. *Hunterian.*

346. A small portion of a *gluteus maximus* muscle, with a large acephalocyst hydatid which was removed from it; the external thin cyst, within which the hydatid was enclosed, is attached to the portion of muscle.

The patient was a healthy woman, 40 years old. The tumour caused by the hydatid on the right buttock was of the size of a large melon; it had been growing for nearly five years, and had occasioned pain in the thigh and leg and inconvenience in walking for six months before its removal. The integuments covering it adhered firmly, and the cyst was so closely united to the fibres of the gluteus in which it was deeply imbedded, as well as to some large branches of the gluteal artery, that after much of it had been removed with difficulty, it was thought advisable not to attempt the separation of the rest. The patient quickly and completely recovered after the operation. The hydatid contained about a pint and a half of fluid.

From the Museum of George Langstaff, Esq.

347. A small portion of bone from the diaphragm of a horse. *Hunterian.*

Specimens of Injuries or Diseases of Muscles in other parts of the Museum :—

Hypertrophy, 1511, 1542, 1562, 1975-6, 2020, 2030, 2540, 2571, and others among the diseases of the Heart, Urinary Bladder, and Urethra.

Atrophy, 9, 10, 1517 to 1522.

Ossification, 3367.

Cancerous Infiltration, 2792.

SERIES IX.—INJURIES AND DISEASES OF TENDONS.

348. A Tendo Achillis, which, together with the integuments behind it, appears to have been cut through. It has united by a tough, irregularly fibrous tissue, the surface of which is closely connected with the depressed cicatrix of the integuments. *Hunterian.*
349. A longitudinal section of the Tendo Achillis, and of part of the os calcis, of an ass. The tendon was divided transversely, and, it is believed, by subcutaneous section. Its divided extremities have retracted to a considerable distance from each other, but are united by a firm and compact substance, pale though vascular, and presenting no appearance of a fibrous texture. A similar substance is diffused among the immediately adjacent tissues. *Hunterian.*
350. The other section of the same parts.
351. The Tendo Achillis of a deer which was divided transversely, and, it is believed, by subcutaneous section. Its interior is shown by a longitudinal incision. The divided extremities are not so far apart as those in the preceding specimens; and the substance uniting them is harder, paler, and obscurely fibrous, like the tissue of a firm and well-formed cicatrix. *Hunterian.*
352. A longitudinal section of the Tendo Achillis of a deer which, it is believed, was divided transversely by subcutaneous section, and in which the process of union has made further progress than in any of the preceding specimens. The uniting medium is not distinguishable from the tendon itself, except by being less glistening, by its fibres being less regularly parallel and longitudinal, and by its surfaces being united with the surrounding fibrous textures. *Hunterian.*
353. The other section of the same tendon.

354. Part of the Tendo Achillis of an ass, which was divided transversely, but probably not by subcutaneous incision. The upper part alone of the tendon is shown: below it (*above* it as the specimen is now placed) a tough and compact vascular substance, like that last described, extends nearly four inches downwards. One of the surfaces of this substance is covered by a thin layer of lymph, as if it had formed part of an open granulating wound. *Hunterian.*

355. Part of a Tendo Achillis which was divided, and was in progress towards re-union. The uniting substance is firm, compact, pale, and obscurely fibrous, and its posterior surface is covered by healthy and very vascular granulations. *From the Museum of Sir A. P. Cooper.*

356. A thin dried section of the granulations from the preceding specimen, showing their vascularity, and that their vessels, after running in nearly parallel wavy lines perpendicular to the surface of the uniting substance, are very closely arranged on the free surface of the granulations. *From the Museum of Sir A. P. Cooper.*

357. A similar preparation. *From the Museum of Sir A. P. Cooper.*

Nos. 19, 20, are other sections of the same parts.

358, 359, 360. The Tendo Achillis, and the tendons of the anterior and posterior tibial muscles of a child nineteen months old. They were all divided by subcutaneous section nearly eighteen months before death. No trace of the division is discernible in any of them; their outlines and surfaces are regular, and their texture is uniform; even with the microscope no part could be found different from the rest.

The child was born with varus. The tendons were divided when it was five weeks old. Six weeks afterwards the foot appeared well formed; and it was finally used in walking, and in other actions, as freely as the other.

Presented by R. W. Tamplin, Esq.

361. "Gouty matter upon the tendon of a finger."

Hunterian MS. Catalogue.

362. A similar preparation.

Hunterian.

363. A finger with gouty disease of the extensor tendon near its attachment to the last phalanx, and a cavity which contained gouty matter over the articulation between the first and second phalanges.

Hunterian.

Specimens of Injuries and Diseases of Tendons in other parts of the Collection :—

Healing after Wounds or Ruptures, 13, 14, 17, 18.

Adhesion, 100.

Specimens of the effects of injuries and diseases of Tendinous or Fibrous Tissue are among those of Diseases of the Periosteum in the Series of Diseases of Bone ; also, among the Diseases of the Joints, especially 928 to 936, and 947 to 954 ; the Spine, especially 988, 991, 992 ; the Capsule of the Spleen, 1491 to 1494 ; the Valves of the Heart, especially 1545 to 1563 ; and the Dura Mater, 2096 to 2106, 2111 to 2117, 2123 to 2136.

SERIES X.—DISEASES OF BURSAE, SHEATHS OF TENDONS,
AND SIMILAR PARTS.

A. *Diseased Bursæ, Synovial Sheaths, &c.*

364. The front of a knee with an enlarged bursa over the patella. The interior of the bursa appears fasciculated with interlacing bands of shining fibres. Its walls are consolidated with the surrounding textures.

Hunterian.

365. A vertical section of a knee-joint. The whole of the articular cartilage has been removed from the femur, and a great part of it from the tibia and patella. The exposed bones are superficially ulcerated, and are covered with thin flakes of lymph. The sub-crureal bursa is large, as if it had been distended with fluid, and appears to be lined by a thin uniform layer of finely granular lymph. The tissues round it are condensed.

Presented by Sir William Blizard.

366. The anterior half of a bursa, from the front of a patella, enlarged, and having its walls thickened, but smooth on their inner surface. *Hunterian.*

366 A. A bursa removed from the front of a woman's patella. Its walls are very thick, tough, and fibrous. Its cavity is nearly obliterated; its remains contained small, thin, oval, seed-like bodies, like those in No. 375.

Presented by Edward Stanley, Esq.

367. An enlarged bursa from the front of a patella. The walls of the bursa are nearly a line in thickness, and appear very tough and laminated; its exterior is smooth; its internal surface is rough, and has two irregular masses of a substance like soft fibrine attached to it, and hanging loosely into its cavity.

Presented by John Gunning, Esq.

368. The tendon of a *flexor carpi radialis* muscle, to the outer surface of which a small "ganglionic" tumour, or bursa, is attached. The bursa was situated in the substance of the loose fibro-cellular investment of the tendon, and was slightly connected with the tendon itself.

From the Museum of John Howship, Esq.

B. *Loose Bodies removed from Diseased Bursæ and Synovial Sheaths.*

369. Several small, flat, hard bodies from a ganglion, or enlarged subcutaneous bursa, which was situated on a wrist. *Hunterian.*

370. A large collection of similar bodies from the sheath of a tendon.

Hunterian.

371. A numerous collection of small white, round, and oval, regularly shaped bodies, many of which are in the form of cells with thick walls. They were removed from a ganglion on a wrist.

372. A similar specimen.

373. A similar specimen, with rather larger bodies.

374. Some similar bodies with small narrow processes extending from one of their extremities, like pedicles by which they may have been at some time attached to the inner surface of the ganglion.
375. A few small flattened and apparently solid bodies, some oval, some irregular in shape, from a ganglion on the wrist.
376. A collection of large irregularly shaped solid bodies, from a ganglion on the wrist. They are soft, and many of them are lobulated and connected by narrow processes.

The six preceding specimens are from the Museum of Sir A. P. Cooper.

Specimens of Diseases of Bursæ in other parts of the Museum :—

Inflammation, 888-9.

Loose cartilages, 317.

Formation of new bursæ, 4, 2315.

Concerning Mr. Hunter's opinion on the formation of these loose bodies, see Vol. I., p. 142.

SERIES XI.—INJURIES OF CARTILAGE.

377. A portion of a fractured costal cartilage. The broken extremities are widely separated, and the space between them is filled by a layer of porous osseous tissue, more than a quarter of an inch thick. The perichondrium is continued over the bone, from one portion of the cartilage to the other. *Hunterian.*
378. Dried sections of two costal cartilages, which were fractured, and of which the overlapping fragments are united by a soft tissue, having the appearance of cartilage. *Presented by Thomas Blizard Curling, Esq.*

Specimens of Diseases of Cartilages in other parts of the Museum :—

Ossification, 1825 to 1830.

Fibrous degeneration, 943 to 949.

Ulceration, in various forms, 900 to 918, 928 to 933, 1854-5-6, 1860-1-2, 2195 to 2198.

Necrosis and Exfoliation, 943 to 949.

SERIES XII.—INJURIES AND DISEASES OF BONE.

1. *Hypertrophy of Bone.*

379. Portion of the right side of the upper part of a skull, in which the middle of the parietal bone is ten lines, and the middle of the frontal bone seven lines, in thickness. Nearly the whole increase is effected by the growth of coarse-textured but healthy diploe; the outer and inner tables are slightly thickened, but of healthy texture. By the thickness of the bone the upper part of the parietal region is elevated, and the capacity of the frontal and parietal regions of the skull is diminished. The grooves for the meningeal arteries are very deep; and there are deep impressions corresponding to the anterior cerebral convolutions. The coronal suture is obliterated.

The patient, a weaver, 30 years old, was in the London Hospital, and destroyed himself by jumping from a window. The rest of the section of the skull is in the Museum of the London Hospital.

Presented by J. J. E. Porter, Esq.

380. Portion of the parietal bone of an idiotic woman thickened by the increase of coarse but healthy diploe. The tables are natural in both thickness and texture.

From the Museum of R. B. Walker, Esq.

Specimens of Hypertrophy of Bone in other parts the Museum:—

2838 to 2844, the skull in 3489, and some other hydrocephalic skulls.

The enlargements of bone in consequence of inflammation, commonly described under the names of Hypertrophy and Hyperostosis, are described and referred to among the specimens of inflammation of bone.

2. *Atrophy of Bone.*

Of the specimens of atrophy of bone, those are placed first [No. 381 to 385] in which the defective nutrition is the result of any ordinary local or general cause of atrophy, such as deficient exercise of the part affected, loss or diminution of its function, continued pressure, insufficient supply of blood, old age, general emaciation, &c. After these examples of simple and uncompli-

cated atrophy, those specimens are placed [No. 386 to 404] in which atrophy constituted the most considerable part of the morbid process, but in which its origin and progress appear to have been determined by some peculiar morbid condition of the part, or of the whole economy; as in cases of rachitis, and mollities ossium.

The atrophy and hypertrophy of bone present illustrations of the general rules expressed concerning those processes in Vol. I. p. 1 to 6, Nos. 1 to 10. Thus, among the examples of simple atrophy of bone, some exhibit a mere diminution in the size, or in the quantity of the tissue, of the bone, that which remains appearing healthy [Nos. 381-2-2a-3-4]: others, with comparatively little diminution of size, present a proportionate increase of the quantity of fatty tissue [Nos. 385, 400, 401, &c.]. The specimens of the first form include most of those which are described under the name of *concentric atrophy*; * those of the second form nearly correspond with examples of *excentric atrophy* of bone.* Many cases of *osteoporosis*, and of the *osteopsathyrosis* of Lobstein,† are also examples of simple atrophy of bone; and the atrophy of old age, in an advanced state, is one of the conditions included under the general term *fragilitas ossium*.

The disease to which, in this country, the term "*mollities ossium*" has been generally applied, and which existed in most of the cases described by Lobstein and other writers under the name of Osteomalacia, appears, by the following specimens from the principal examples recorded by English authors, to be an atrophy with "fatty degeneration" of bone; a disease which, according to its anatomical characters, should be classed with the spontaneous or primary "fatty degenerations" of the heart, voluntary muscles, liver, pancreas, and other organs. Except by the history of the cases in which it occurs, and the greater degree which it usually attains before death, this disease is hardly distinguishable from the atrophy, in the form of fatty degeneration, of the bones, which is frequent in old age. The comparison of the skull, No. 395, from an adult with mollities ossium, with the skulls, Nos. 392-3, taken from children with rachitis, will show, also, a more intimate relation between these two diseases than the changes which the long bones undergo in them would suggest.

381. A femur extremely atrophied, probably in consequence of inaction of the limb. Its size is diminished in every part, but more in the shaft than in

* 'Observations on some of the forms of Atrophy of Bone.' By Thomas Blizard Curling; in the Medico-Chirurgical Transactions, vol. xx., p. 336. London, 1837.

† 'Traité d'Anatomie Pathologique,' T. ii., p. 116 and p. 204.

the epiphyses and processes. The tissue of the wall of the shaft is hard and healthy, but that of the two extremities is so thin and dry that it easily yields to pressure. *Hunterian.*

382. The upper part of a dog's skull exhibiting atrophy, probably consequent on the pressure of hydatids. It is everywhere thin, though not enlarged; and in three places is perforated by apertures, which have sharp edges and are closed by membrane. *Hunterian.*

- 382 *a.* Section of a femur, which was fractured through its middle third, below the canal in which the great nutritive artery traverses its wall to the medullary tissue. The upper portion lies in front of the lower one, but is firmly united to it by new bone formed between them and at their sides. The section shows that in the lower portion (which was deprived, by the fracture and displacement, of its supply of blood through the nutritive artery), the walls are atrophied and, consequently, thinner than those of the upper portion. The cancellous tissue in the lower portion is also very light and delicate.

From a man thirty years old. The fracture occurred four years before death.

*Presented by Thomas Blizard Curling, Esq.**

383. Atrophied bones of a child's foot. Portions have been cut from them with a knife, and the cut surfaces are smooth and scarcely broken. The walls are very thin: in the thickest part of the os calcis, they are less than half a line in thickness, and at the articular surfaces their sections can hardly be discerned beneath the cartilages, which are, proportionally, rather thick. The cancellous tissue is light, its spaces are large, and the lamellæ and filaments of bone which surround them are coarse and thick.

From the Museum of George Langstaff, Esq.

384. A vertical section of the bones of a knee-joint, atrophied in consequence of more than three years' inaction. The femur and tibia are united by bone at a right angle, and the patella is united to the front of the outer

* The specimen is an illustration of a general rule concerning atrophy after fracture of long bones, which is explained by Mr. Curling in his 'Observations' already referred to.

condyle of the femur. In its thickest part, the wall of the femur is only half a line in thickness; in most situations, both it and the walls of the tibia and fibula are not more than one-fourth of a line thick; and in the walls of the tibia there are several large holes produced by the gradual thinning. In the cancellous tissue of the femur and tibia, the naturally close-set lamellæ are replaced by a few long and slender filaments of bone, forming a wide net-work. The cancellous tissue of the patella is healthy. The bones are slightly reduced in size: their external surface appears healthy, but very greasy.

The history of the case is related as a 'Remarkable Case of Eccentric Atrophy of the Bones, by John Thurnam,' in the 'London Medical Gazette,' vol. xxiii., p. 119. London, October 20, 1838.

The patient, a girl 19 years old, was in the Westminster Hospital. "She was completely crippled and bed-ridden, from rigidity of all the principal joints; lying constantly in one position on the back, with the knees separated as far as possible from each other, the thighs flexed slightly on the abdomen, the legs almost forming right angles with the thighs, and the feet everted. The upper extremities were permanently extended, from the ankylosed condition of the elbows and shoulders, but she retained the use of many of her fingers. . . . The joints generally, but especially the knees, were pale and glabrous, and appeared enlarged; but this was probably owing, at least in part, to the wasted condition of the muscles and other soft parts. Great pain was excited by pressure or attempts at extension of the joints; but at other times she did not suffer. . . .

"She stated that her illness commenced about three years since, after getting wet in the feet, in the form of a rheumatic affection of the joints; there being pain and swelling of the left foot and both the knees, for which she had little or no medical treatment. . . . She was confined to the house for two months, after which she got out again for twelve months, hobbling along with a stick in great misery. The disease however increased, and gradually extended all over the body, in the shape of stiffness of the joints, so that about two years before her admission into the hospital she was obliged altogether to take to her bed. . . . She had been living in a state of comparative distress, and had for some time been sleeping in a room with a damp stone floor."

She died nearly four months after her admission into the hospital with empyema and pulmonary tubercles. After death "several of the principal joints on both sides of the body were found to be the seat of fibro-cartilaginous ankylosis, passing into the osseous form. . . . The tendons and ligaments around the joints appeared quite healthy. The remains of the synovial membrane of the knee-joints were thought to be rather more vascular than usual. The calvaria was the only portion of the osseous system examined that retained its healthy character. Nearly all the bones of one

upper and of both lower extremities, and the bodies of the vertebræ, were examined, and were found to be the seat of extraordinary eccentric atrophy. . . .

“ The left tibia, after maceration and drying, weighed one ounce and three-eighths troy. The periosteum was detached more readily from the bones than usual.” The texture of the atrophied bones was not either softer or more brittle than is natural.

Presented by John Thurnam, Esq.

385. Section of an atrophied humerus from an old person. The shaft is generally reduced in size, and the neck of the bone appears rather shorter than is natural. The walls are thin but hard; the spaces in the cancellous tissue are large, and filled with adipocire, indicating an increased quantity, and, probably, a morbid quality, of the fatty matter in this part of the bone.

Presented by Thomas Blizard Curling, Esq.

The specimen is represented in the *Medico-Chirurgical Transactions*, Vol. xx., pl. 5 ; in illustration of the paper already referred to at p. 17.

386. Sections of the humerus of a young lion, which was affected with rickets. The humerus does not appear to be reduced in size, neither is there any disproportion between the thickness of its walls and the quantity of its medullary tissue: but its whole texture is greyish, light, dry, and friable. The strongest parts of the walls are formed of a very fine and close spongy texture, covered in by a thin layer of compact bone; but near the articular ends this outer layer is wanting, and the bone has a finely porous, woollen cloth-like, or reticular surface. The cancellous tissue has its ordinary arrangement, but the fibres and lamellæ composing it are slender, thin, and weak.

Hunterian.

387. Parts of the femur of the same lion, similarly, and rather more, diseased. The shaft has been fractured at the junction of its upper and middle thirds, and no union has been effected, although some very light and spongy new bone has been formed about the ends of the fragments. The lower part of the shaft, also, has been bent; its posterior wall is transversely fractured, and its upper broken edge is driven into

the cancellous tissue of the lower fragment. Both fractures appear to have occurred many days before death. *Hunterian.*

The left femur, similarly fractured in the upper part of its shaft, and many other bones of the same lion, are preserved in No. 2854. They were marked "Rickety Lion."

388. Sections of the ulna of a monkey. They present the same kind of atrophy as the specimens last described, but in a more advanced degree. Scarcely any trace of the outer compact layer of the wall remains; its surface is in some parts minutely porous, in others composed of finely reticulated fibres. The sections of the ulna present appearances of laminae composing the wall, but separated from each other, as if the tissue they once formed had been expanded; and in the place of the cancellous tissue there is a nearly uniform, delicately filamentous, osseous substance, the cut surface of which is just like that of rather coarse woollen cloth. A similar osseous substance has been deposited around the upper part of the shaft of the ulna; the whole of which is light, and so friable that it might be easily crushed between the fingers. *Hunterian.*

The bones of the skull and many others of the same animal similarly diseased are preserved in No. 2855.

389. Sections of part of a boy's femur, which was fractured several years before death. The fracture occurred near the upper third of the bone, and the portions are united at a right angle. The medium of connection is a large quantity of spongy osseous tissue, accumulated at the posterior surface of the bone, within the angle formed by its two portions. The ends of the fractured portions are closed by osseous substance. Both above and below the fracture the bone is atrophied; its walls are very thin, and their lamellae are separated; the greater part of the lamellae of the cancellous tissue of the shaft have been removed. The head and neck of the femur are light and spongy; and the lamellae of the cancellous tissue near the trochanters are thicker and less numerous than usual.

At the time of the fracture, the child was suffering from rickets. He was born deaf and dumb, and had been always very delicate. At death the other femur, (though it had not been fractured), and the two humeri, were nearly as much bent as this.

From the Museum of George Langstaff, Esq.

390, 391. Two femora, from a person of nearly adult age, the upper epiphyses being completely, the lower nearly, united. They are similarly and symmetrically altered, and both exhibit the effects of rickets partially recovered from. The upper and middle thirds of their shafts are curved forwards, and laterally compressed; and the *linea aspera* at this curved part projects far backwards, its posterior margin forming the chord of the arc which is formed by the anterior wall of the femur. All this part of the bone appears of healthy texture; it is hard and heavy. The heads and necks of the femora, also, are healthy, except in that the surfaces of the necks are rather rough, and their lower borders appear swollen, bulging downwards a little.* The greater part of the surface of the lower third of each femur presents the same rough, coarse woollen-cloth-like appearance as is shown in the bones of the rickety lion, No. 386-7, and in a more advanced stage in the next specimen—the frontal bone of a rickety child. A part of the anterior surface between and above the condyles is free from this change; and this part is of exactly the same form and extent in both the bones. *Hunterian.*

392. The frontal bone of an infant which had rickets. The greater part of the bone is thickened, and converted into a light, dry, finely porous, and friable tissue, the external surface of which (like that of the preceding specimens) is rough, resembling the surface of coarse woollen cloth, and slightly raised above the more healthy part. The change of structure affects exactly symmetrical portions of the two lateral halves of the frontal bone, and appears to have made progress from its circumference towards its original centres of ossification; for these centres, together with a space of irregular shape around them, are free from the disease. On the inner surface of the bone the same change of structure, though in a less advanced stage, is more generally diffused; and the whole thickness of the bone appears, at least in some parts, to be similarly diseased.

Hunterian.

* A similar condition is more plainly shown in an atrophied femur preserved in No. 3231.

393. The upper part of the skull of a child, about four years old, diseased similarly to that just described; but the disease is more advanced in both degree and extent. The bones are in some parts six lines in thickness; the tissue of both their surfaces and their interior is nearly all converted into a uniform, light, and finely cancellous substance; and, except on some parts of the interior of the skull which were adapted to spaces between the cerebral convolutions, there are no remains of the compact tissue. The fontanelles are not closed.

Hunterian.

394. Fragments of the frontal and parietal bones of an adult, which, by the further advance of disease like that shown in the preceding specimens, have been increased to a thickness varying in different parts from half an inch to an inch. Their texture is almost uniform, portions only of the tables retaining traces of their compact texture. The bones are throughout very finely cancellous, the cells being small and irregular in form; their boundaries thick, and in many parts formed by tortuous lamellæ. In general texture the bones are brittle, and portions of them may be easily rubbed into a coarse powder; their weight is increased, but not in proportion to their bulk. The remains of the inner and outer tables are uneven, and perforated by numerous apertures for vessels; the grooves for the meningeal arteries are large and deep; the sutures are obliterated. The cavity of the skull appears not to have been diminished.

Hunterian.

395. A small section of a frontal bone, half an inch in thickness, and presenting, with scarcely any trace of the natural distinction of tables and diploe, the same uniform, porous, very finely and closely cancellous texture, as the preceding specimens, especially the two preceding.

The case is described as one of 'Osteo-malacia rubra et fragilis' by Mr. Solly, in his 'Remarks on the Pathology of Mollities Ossium,' in the *Medico-Chirurgical Transactions*, vol. xxvii. [2nd Series, vol. ix.], p. 437. London, 1844.

The patient died when twenty-nine years old. To the age of sixteen she was healthy, and inclined to be corpulent. At nineteen, after an attack of scarlet fever, her health began to decline, and two or three years afterwards, from a very slight cause, her

clavicle was fractured. No union of the fracture took place. When twenty-four or twenty-five years old, her spine began to yield, and she, suddenly, had paralysis of the right hand, which continued fourteen days. About this time also, after suffering for six months from a slight injury of the knee, she first showed signs of insanity; and, not long after, during convalescence from acute rheumatism, in the course of which she was occasionally delirious, she became maniacal. From this time, through the last three years of her life, she remained insane; and for the last two years and a half was unable to stand alone. "She was carried, or pushed herself from place to place on her haunches, and she frequently screamed violently as if in pain." About two years before death her head was observed to be enlarged, and her eyes projected, in consequence (as it was afterwards found) of the thickening of the walls of the orbit. Six months before her death she was admitted into the Lunatic Asylum at Hanwell. At this time "she was much emaciated, and enfeebled, with loss of power in her lower extremities [which had first been observed within the preceding year]; and two or three months before her death the bones of the extremities were observed to lose their natural direction, and become curved; subsequently, fractures took place from the slightest causes. She suffered excruciating pain during the whole time she was in the asylum, which she referred to her bones; she did not suffer from spasm of the muscles, . . . and the urine, during the whole time she was at Hanwell, was clear and natural. Her appetite was good, and all the functions duly performed, with the exception of the catamenia. . . . Her mental aberration was extremely slight."

Post-mortem Examination.

" Height, measured after death, four feet two inches;—great emaciation. Head large in proportion to the size of the body; chest very much deformed, pinched up, and projecting anteriorly,—very narrow from side to side; the ribs appeared widened, the pelvis extremely narrow. Spine curved forwards almost at a right angle in the upper dorsal and cervical regions. Both clavicles broken and bent at an acute angle. Head of one humerus swollen; shaft of the left, broken and bent; radius and ulna slightly swollen, the right radius broken, the lower extremities enlarged at the epiphyses. Ossa femora on both sides broken; that on the right side in one place, that on the left in two; the fractured portions were held together by the periosteum, but there was no attempt at union, no appearance of callus. Tibia and fibula in both limbs bent; all the bones of the extremities could be fractured with the slightest force,—by merely pressing them between the finger and thumb, they gave way and cracked like a thin-shelled walnut. A longitudinal and transverse section of the long bones showed that the osseous structure of the bone was nearly absorbed, a mere shell being left. The interior was filled with a dark grumous matter, varying in colour from that of dark blood to a reddish light liver colour.* The bones of the vertebral

* For evidence of the identity of the changes here described with those observed in the following cases of fatty degeneration of the bones, see a foot-note at p. 30.

column and ribs were very much thickened, and at least half an inch in diameter, so very soft as to be easily cut with a knife, and very vascular; the two tables were confounded, and the diploe [apparently] obliterated. . . . The Haversian canals enormously dilated, and the osseous corpuscles diminished in quantity. Joints all healthy. . . . The brain and other viscera perfectly healthy."

"Chemical analysis of the bone, by Dr. Leeson:—

<i>Medulla.</i>		<i>Bone.</i>	
Animal matter	24·78	Animal matter	18·75
Phosphate and carbonate of lime .	1·83	Phosphate and carbonate of lime	29·17
Water	73·39	Water	52·08"

Presented by Samuel Solly, Esq.

396. The upper part of a skull increased in thickness and weight. The chief increase is in the frontal and occipital regions, of which the bones are between five and six lines in thickness. The thickening is accompanied with a considerable decrease in the capacity of the skull, which decrease is indicated externally by the flatness of the frontal and superior occipital regions. The external surface of the skull appears finely porous, being perforated by numberless minute foramina; on the internal surface the vascular grooves are very deep and numerous, and a similar, but more coarsely, porous appearance is produced by the number of larger apertures perforating it. The parietal foramina are upwards of a line in diameter. There is no clear distinction between the tables and the diploe; both tables are converted into a nearly uniform, heavy, and hard texture, and, except on the surface, there is no trace of their compact tissue. The sutures are obliterated. *Hunterian.*

The changes may be regarded as the results of a process of induration subsequent to, and in a measure reparatory of, a state of the bone similar to that shown in Nos. 392 to 395; an induration which appears to have been accompanied with thickening of the minute walls of the cells, till their cavities were reduced to minute pores.

397. A small circular piece of a skull, similarly thickened and indurated.

Hunterian.

398. "A specimen of mollities ossium injected." *Hunterian MS. Catalogue.*

The history of the patient from whom this preparation was taken is recorded in "A

Case of Fragility of the Bones. By Mr. W. Goodwin, Surgeon at Earl Soham, in Suffolk," in the London Medical Journal, volume vi., London, 1785, 8vo., p. 288; and in a "Farther Account of a Case of Mollities Ossium," by the same gentleman, in the 8th volume of the same Journal, at p. 67.

"Mary Bradcock, a poor woman of the parish of Dallinghoe, near Wickham Market, in Suffolk, in the severe winter of 1783 was seized with pain in most of her limbs, which she attributed to rheumatism, when one day, walking across the house, she tripped her foot against a brick, and was much surprised to find her leg broken near the ankle. Before she was perfectly recovered from this accident she became pregnant, and, growing infirm and weak, was one day assisted by her husband in getting out of bed, when her left thigh-bone snapped asunder, though no particular force had been exerted.

"She was safely delivered, and, soon after, her left arm was fractured near the shoulder, merely by putting it over the neck of an assistant to raise herself in bed. This likewise formed a callus, and grew well. She next found her right thigh bone broken as she lay in bed, very high up towards the hip, as it was, likewise, some time after, lower down near the knee. One of her collar bones has also separated without violence. Her right arm has met with a like misfortune by lifting a pint bason from a table.

"She now lies with the third fracture of her right thigh, which happened last Sunday (from her being gently raised in her bed), at or near the part by the knee which was before broken and united by callus.

"The bones are permitted to grow together in an irregular manner, with the assistance only of bathing and bandage, as an extension of the limbs would be dangerous; for so deplorable is her situation, that she cannot venture to be moved, even to have her bed made, for fear of breaking her bones.

"She is thirty-two years old, of a delicate make, lax fibre, fair complexion, and pale brown hair. She is at present in the sixth month of her ninth pregnancy; has always been temperate in her manner of living; has never taken mercurial medicines; and has, in general, enjoyed a good state of health.

"Before the bones break she constantly feels a considerable pain, for several weeks, on the very spot where the fracture is to take place. This pain continues to increase till the bone breaks, and then goes off in a few days, and the bone unites in five or six weeks by forming a callus. She now complains of pain a little above one of her elbows, and, from what she has so repeatedly experienced, expects that her arm will break at that part. This unhappy woman has had eight fractures within the space of a year and a half, seven of which have happened in the course of the last twelve months, and all without any sufficient, or, indeed, any external cause to which they could be attributed.

"*Earl Soham, near Framlingham, in Suffolk,*
August 7, 1785."

Some observations are added to this account by Dr. Hamilton of Ipswich: and in his further account of the case Mr. Goodwin says:—

“ At the date of my former account she was in the sixth month of her ninth pregnancy, and had been confined to her bed near twelve months. At the usual period she was delivered of a healthy male child, that lived fifteen weeks ; and being enabled, by the benevolence of the humane persons who contributed to her relief, to procure all the comforts her forlorn state admitted, she regained a better state of health than she had known for some time before.

“ During the spring of 1786 she continued in good health and spirits ; but complained at times of pain flying from bone to bone. About the beginning of April she again became pregnant ; but had no alarming symptoms till August, when the pain of her bones increased rapidly, and those which had been broken in 1785 began to separate where they had united with as great, or even more, pain than at their first breaking. This excruciating pain, which she suffered for several days previous to the dissolution of the callus, rendered her continually feverish from the irritation, and she declined hastily in health and appetite.

“ Violent pain now seized fresh parts of the bony system, which, after a continuance of six or seven days, was sufficient to occasion new fractures, viz., of three ribs, and of each arm above and below the elbow, making, together, seven fractures, which, with the eight that happened in 1785, and the dissolution of their union the year following, make no less than twenty-three fractures which this unhappy woman suffered within the space of about two years and a half, and all without any violence, and chiefly while confined to her bed, in which she passed the whole of the last year of her life, lying constantly on her left side. You will be pleased to observe also, that in 1785 the pain continued several weeks before a fracture took place, but that of late a few days were sufficient to dispose the bones to give way.

“ She died on the 19th of December last, aged four and thirty years. Her bones, when examined after death, were found to be so extremely soft, that even those of her arms could be easily cut through with a small pen-knife. The bones of the cranium had not escaped the effects of the disease, as they could easily be indented with the pressure of a finger. Of all the bones, those of the lower extremities had suffered the least, and but little softness was observable in them : the back-bone, on the contrary, was a good deal affected, for it was nearly as soft as cartilage.”

This paper is followed by “ Observations on the Case of Mollities Ossium, described in the preceding Article ; with some general Remarks on that Disease. Communicated in a Letter to Dr. Simmons by John Hunter, Esq., F.R.S., Surgeon Extraordinary to the King.”

“ I beg leave to return you my thanks for your attention in sending me the very curious arm of the subject affected by the mollities ossium ; and as you propose to publish the case in the next part of your Medical Journal, I have sent you some general observations upon the disease, with a few remarks on the dissection of this arm : these, if you think they will render the account more complete, may be annexed to it.

“ This disease, commonly known by the term Mollities Ossium, in the adult, is, in

my opinion, a species of the rickets which is peculiar to youth, and arises from a disposition for absorption of the substance of a bone, or a disproportion between the powers of depositing new matter and those of removing the old: this, in many instances, has been carried to a much greater extent in the full grown than in the young subject; for in the most rickety child I have ever seen there was always some earth in the bones; but I have seen them in the adult so soft from the loss of the calcareous earth, that they have been almost as flexible as a tendon, and such bones have had little or nothing of the appearance of the natural animal part of a bone when only deprived of the earth; therefore they are not composed of the original animal part, but a new deposit of animal substance in a different form.

“ In some of these bones it is curious to see the effects produced by the two different dispositions. In one part of the bone the ossific disposition is taking place, and forming bone in the cavity, and in some places on the surface, of the original bone; but the disposition for absorption goes on too fast for the ossific, and even absorbs portions of the newly-set-up ossifications.

“ Previous to my examination of the arm from the person whose case has been communicated to you, I injected the arteries, with a view to see if any alteration had taken place in that system of vessels; and in the dissection I observed the following appearances:—

“ The muscles, blood-vessels, nerves, and absorbents, as far as they could be examined, were in no way remarkable.

“ The os humeri was more vascular than is common, from which we may conclude the other systems of vessels were also increased; and it is probable that the absorbents were principally so, for we may remark, that whenever a part has greater actions to carry on than what are natural to it, the number of vessels which are the active parts of the body are always increased. The bones of the fingers were lighter and less compact than common. Those of the metacarpus were in some degree softer; the radius and ulna were still more so, and the os humeri was, if the expression is admissible, completely diseased.

“ As I had not an opportunity of examining the different bones of the body, nothing can be ascertained respecting the disease being confined to particular bones, or its affecting equally those of the trunk and extremities; but the ribs could not have been equally diseased with the os humeri, without affecting the respiration so materially as to have made the patient very uncomfortable from that cause, which, as appears in the account, was not the case; for although the diaphragm might have acted very well, it is necessary that it should have a circle of fixed points to act from to produce its effects in respiration.

“ The os humeri retained its shape externally, and the cartilages at both the articulations appeared not in the least affected.

“ The component parts of the bone were totally altered, the structure being very different from other bones, and wholly composed of a new substance, resembling a species of fatty tumour, giving the appearance of a spongy bone deprived of its earth

and soaked in soft fat. This structure was most remarkable under the external lamella, which was not so much altered, making a kind of case for the other, and having the periosteum adhering to it, the whole could be readily cut with a knife.

“Near to the condyles a portion of this substance had been deficient for nearly two inches of the bone’s length, and the outer shell at this part filled with a bloody fluid contained in cells. This part of the bone readily bent, and in the living body had been mistaken for a fracture; there was a similar appearance a little higher up than the middle of the bone for nearly an inch in length.

“The radius and ulna exhibited the same structure and appearances as the os humeri, and were also free from any absolute fracture, but had portions of the internal structure deficient, and the space filled up by a bloody fluid.

“It is probable that those parts which gave way first to the action of the muscles and other circumstances, and which appeared to be fractures, had those parts afterwards absorbed from a kind of necessity stimulating the absorbents to remove the parts so affected.

“*Leicester Square, March 1, 1787.*”

399. A part of the other section of the same humerus dried, and shrivelled into a tough flexible mass, like a piece of dried muscle. *Hunterian.*

The other bones of the upper extremity are preserved in No. 2863.

400. A left femur, which was fractured, near the junction of its middle and lower thirds, while the patient was being turned in bed. The portions are imperfectly united by light and friable new bone deposited about the seat of fracture. The surface of the shaft is rough, through the irregular removal of small portions of its outer compact laminae: it is more than naturally curved forwards; and the neck forms hardly more than a right angle with its axis. The whole texture of the bone is very light and greasy, and, in drying, the greater part of it has acquired a dark mahogany colour: the walls, at every part, except near the trochanters and linea aspera, and on the neck and head, may be broken and crushed by the pressure of the hands. *Hunterian.*

From an Archbishop of Canterbury. The upper part of the other femur, also fractured by a slight force, is preserved in No. 2864.

401. Longitudinal sections (made with a knife) of a left femur, affected with

mollities ossium. The whole of the osseous substance has been removed from the shaft. In the place of the walls of this part there is nothing but the periosteum, increased to nearly a line in thickness, and of a deep pink and brownish-crimson colour. The space which it encloses is about as large as the shaft of an ordinary female femur, and is filled by a soft, reddish, probably fatty, substance, varying in consistence at different parts. When recent (and these characters are still nearly preserved), "one mass presented the appearance of almost pure coagulated blood, another resembled a very gorged state of the liver, though scarcely more firm than dark blood; at one point it was of a comparatively light fibrinous* character; at another the appearance was more that of a compact fleshy substance."

In many situations, also, in this substance, there are small oval cavities, containing oily fluid; and a large quantity of oil has oozed from it. At the condyles, the trochanters, and the head and neck of the femur, some of the cancellous tissue, and a thin layer of the wall of the bone remain; but they are very soft, and are infiltrated with a substance similar to that by which the whole of the shaft is replaced.

About five inches below the trochanter major the shaft has been broken; but it has re-united by a thin layer of a firm pink substance, and the periosteum is contracted around the fractured part, so that it is reduced to half the size of the rest of the shaft. About three inches below this a second fracture occurred, and the parts did not again unite. The articular cartilages are healthy, and of their natural thickness.

From the Museum of John Howship, Esq.

402. A vertical section of the right femur of the same patient, exhibiting similar changes; but the colour has been destroyed by immersion in water. A fracture had occurred in the part of the shaft exactly corresponding to that at which the left femur was fractured, and has united with a similar contraction of the periosteum.

From the Museum of Robert Liston, Esq.

* Meaning, probably, that it was like coagulated blood almost decolorized.

403. The remains of a vertical section of the head, neck, and upper part of the shaft of the right femur of the same patient, after maceration and boiling. There is scarcely sufficient of the osseous tissue left to indicate the original form of the bone: of the shaft and neck nothing remains except a few small osseous lamellæ, held together by fine fibres; but in the place of the trochanter major, and the head, there are small masses of cancellous tissue, filled with adipocire. A portion of the trochanter major is suspended separately. At the bottom of the bottle is a large quantity of white crystalline fatty matter, which was obtained by boiling this portion of the femur after the whole of its soft contents had been converted, during maceration, into a substance like adipocire.

From the Museum of John Howship, Esq.

The following is an abstract of the "Case of Mollities Ossium, with the Appearances on Dissection, by John Howship, Esq.," in the Transactions of the Medico-Chirurgical Society of Edinburgh, vol. ii. p. 136, Edinburgh, 1826; from which, also, the sentences above quoted between inverted commas were taken.

The patient was a lady thirty-five years old. In October, 1816, she believed she caught cold; and, shortly after, it was observed that "she walked rather stooping, and in a rolling manner." In the beginning of 1817 her condition rather improved, and the catamenia, which had disappeared since she caught cold, returned; but her gait continued tardy and awkward. In the autumn of 1818 she became much worse and weaker; she walked more slowly and feebly, and could not quicken her pace. Her state was made worse by a three months' course of mercurial medicines, which reduced her to extreme weakness. In the spring of 1819, after a residence in the country, she partially recovered; but was still unable to walk without support on both sides. In the summer of this year she thought she caught cold; and had the first attack of a pain in the right hip, which afterwards was one of the most prominent symptoms. The illness lasted only a few days, but she was much reduced by it, and, in walking after her recovery from it, the least blow on the right foot produced such a shock in the hip as endangered her falling. In October, 1819, after sea-bathing for two months, her health was greatly improved; so that she could stand and walk alone; but she soon again relapsed, and in March, 1821, was obliged, by the return of excruciating pain in the right hip, to give up all attempts to walk. A seton was kept open in the back for five months, for the curvature of the spine which was now supervening; but it was useless; and in August, 1821, she was advised to confine herself to her bed. At the end of September, 1821, as she was being gently lifted into bed, she felt such a sudden "distress" in the right thigh (which had long been very painful) as induced her to believe that it was broken; but no noise of fracture was heard. She remained all night in great pain, and on the following morning the thigh was found bent. It was

kept quiet, but not confined; and three weeks afterwards, she awoke one morning in extreme agony, with the middle part of the right thigh "raised up like an elbow," and the muscles around it affected with painful cramps and spasms. Next day the limb was placed in splints; but from this time it remained subject to painful spasmodic startings.

About a month after this accident to the right thigh, the left also, which had been for several previous days very painful, appeared to break; she awoke in the night with great agony and starting in it; and next day signs of fracture were found. It was, like the right thigh, placed in splints.

In December, 1821, when Mr. Howship first visited this patient, he found (besides what has been already mentioned) that she was extremely nervous, so that the most trifling irritation of the skin, or the mere mention of her complaints, or the attempt to swallow, would often bring on severe pain and spasms in the thighs. The left arm was also so painful and weak that, recollecting what she had suffered in her thighs, she was afraid of lifting it from the pillow; and she had pain in the wrist, and in the bones of the hand and fingers, "as if the bones were swelling violently." Under the use of cinchona and mild aperients she became for a time considerably better; the pains in her bones and the spasms nearly ceased. On the 16th of December Mr. Howship "examined both thighs The skin was moist and clammy, but extreme apprehension of suffering on their exposure induced her to entreat that they might not be touched; so that the degree of firmness the bones might possess could not be ascertained. Upon passing my finger along the surface of the integuments of the thigh, large drops of perspiration were immediately seen to start out along the lines, and there only; an experiment I several times repeated, and always with the same result. Neither was the fluid excreted less singular; possessing, as it did, a strong, very unpleasant, and most unusual odour It was remarkable, that adjusting the left thigh excited uneasiness in the right, and the right in the left; while no distress was felt in the limb under adjustment."

After the first week in January, 1822, the case made no progress. At times the patient was better; but at other times, apparently in consequence of exposure to cold, the same "tight, starting, and swelling pains, in the middle of the bone in each arm and each thigh; and some, though few, spasms," returned. The sensations in each femur were often "as if a string was tied tight round the middle of each bone;" in the parts exactly corresponding to those at which, after death, the contraction of the periosteum was found. Profuse fetid perspiration also sometimes came on suddenly. At the end of April, when the thighs were examined, the bones were found united, but they were flexible, and could be bent to and fro, without any snapping, or grating, or pain. In this month her health rapidly declined; she had occasional diarrhoea, with bloody evacuations; her urine was small in quantity, thick and turbid, as if it contained putrid blood; the flexors of the arms were sometimes spasmodically contracted; the lower limbs became very œdematous; and she died gradually on the 6th of June, about five years and a half from the first appearance of disease in the lower extremities.

403 B. Section of a femur, fractured, by a slight force, transversely through the

middle of its shaft. It is of natural size ; but its walls are about one-fourth of a line in thickness, their lamellæ are separated, and their texture is so soft that they may be easily divided with a knife. The osseous portion of the cancellous tissue has been removed from the whole length of the shaft; the medullary tube is full of soft fatty matter. In the recent state, this fat “ closely resembled the medulla of an old subject ” . . . “ with some dark spots produced by extravasated blood,” . . . and “ patches of a light red colour, from the minute vessels of the medullary membrane being highly injected with red blood : ” now, after the action of water and alcohol, it is uniformly pale, shrunken within the medullary tube, and, in general appearance, like lard. In the head and neck, as well as in the trochanters and condyles of the femur, there are some remains of the osseous part of the cancellous tissue, forming large cells, which are full of the same kind of fatty matter as that in the medullary tube of the shaft. At the fracture, the ends of the bone are slightly connected by the periosteum and by ligamentous substance.

Presented by the Museum-Committee of the London Hospital.

The case is described by Mr. Curling, in the paper already referred to, as one of “ Eccentric Atrophy of Bone, or Mollities Ossium.”

The patient, a woman seventy-two years old, had been bed-ridden, on account of paralysis of the lower extremities, for nearly four years. Her hip and knee joints had been long bent, and could not be straightened ; and for some years she had had great pains in her knees and thighs. She had been subject to hysteric fits, and to slight cough ; and for many years had vesico-vaginal fistula. A month before her death, as she was being turned in bed, her thigh was fractured ; and a fortnight afterwards, as she was being moved, her right humerus was also broken. From this time she gradually sank.

In the examination after death, it was found that (besides the changes in the femur already described) “ the bones of the skull and pelvis might be cut with a strong knife, but the ribs and vertebræ were only slightly affected, being scarcely less firm than usual. . . . The tibia consisted of a mere shell of bone, elastic, and yielding under the finger like a thin piece of ivory, the cancelli being removed, and the interior filled with medulla.” The bones of the foot were similarly diseased, but in a less degree. The walls of the bones of the upper extremities were thin, and their medullary cavities were enlarged ; but the substance of their walls was harder than that of the bones of the lower extremities. The heart was flabby ; the other viscera, and all the joints, appeared healthy.

An analysis of seventeen grains of the radius of this patient, which was in an incipient state of the disease, was made by Dr. Pereira ; it yielded

“ Earthy matter	7.4
Animal matter and water (not got rid of by drying)	9.6”

An analysis, made at the same time, of an equal weight of a healthy ulna, from a subject of the same age as this patient, yielded

“ Earthy matter	10
Animal matter and water (not got rid of by drying) .	7”

In maceration, the medulla was converted into adipocire, which completely filled the tubes formed by the thin walls of the bones.

403 B. Section of a femur, fractured by a slight force through the junction of its upper and middle thirds. It has been macerated and dried. Its walls are thin, soft, and flexible, and their lamellæ are partially separated. Every part of the interior of the bone is filled with adipocire. In the recent state, the place of the medullary and cancellous tissue was occupied by soft, jelly-like, transparent fat, coloured in various shades of yellow and pink, with blotches of deep crimson ; and a similar kind of fat appeared to be infiltrated in the walls of the bone. Both in the recent state, and after maceration, it closely resembled the specimen last described.

The patient was a woman sixty-nine years old at the time of her death. For many years before death she had suffered obscure signs of disease, referred at different times to several organs, and variously treated without any benefit. She was unable to stand without support, and was confined to her house, and generally to her bed. She was made much weaker by a course of mercurial medicine to which she was subjected ; but shortly afterwards, under the use of tonics, she became stronger, and was able again to walk, though feebly. This improvement occurred about three years before death. Two years later she was affected with pains in nearly all her limbs, which were considered rheumatic ; and were treated accordingly with various medicines, but without avail. She grew weaker, was soon again confined to her bed ; and, three days before her death, her thigh was fractured in an effort to move her. After this she sank rapidly.

Many of the long bones, examined after death, were in the same state of disease as that described above, and as others preserved in the Museum of Saint Bartholomew's Hospital. With the microscope, the constituents of the yellow, pink, and crimson substance occupying the place of medulla were found to be,—free oil in large quantity, globular and disc-shaped masses of crystals of margarine free or enclosed in fat-cells, a few fat-cells like those of healthy medulla, and numerous empty and collapsed fat-cells

with nuclei. The pink and crimson colours appeared to be due entirely to a portion of the oil-globules, and of the nuclei and granules in the collapsed fat-cells, being so coloured. The bone-corpuscles were healthy, but not numerous.

Presented by R. W. Tamplin, Esq.

403 c. Section of the lower third of a femur, presenting appearances very similar to those observed in the recent bones of the patient whose case is last described. The femur is of natural size, but its walls are not anywhere more than half a line in thickness; they are soft, compressible, easily cut; and in some places at the back of the femur their whole thickness is absorbed, and large apertures are formed at which the cancellous tissue is covered in by the periosteum alone. Of the cancellous tissue, the osseous part remains within and just above the condyles; but elsewhere it is removed. The lamellæ and fibres which it forms within the condyles are slender and wide apart, the spaces between them being full of bright-yellow, soft, fatty matter. Above this part the medullary tube contains no osseous substance, but is filled with soft yellow, pink, brownish, and blood-coloured fatty matter, which has in parts a transparent gelatinous appearance. This fatty matter, in the recent state, exhibited various hues, from a deep Modena red to a bright crimson; and the irregular empty spaces which it presents were, in the recent state, filled with fluid like serum. The upper part of the specimen is broken; a fracture having here occurred, in consequence of very slight force, twelve months before death. In the recent state, "the extremity of the bone, to the extent of about one-third of an inch [above the articular cartilage], was of a bright-red colour."

The case is related by Mr. Solly in the paper already referred to, page 23; and engravings of the patient's distorted form, and of sections of some of the bones, are appended to the paper.

The patient was thirty-nine years old when she died, in April, 1844. She had good health till May, 1841, when her strength began to fail, and she was seized, while stooping, with a violent pain in her back. In June, 1841, she was first affected with what she supposed to be rheumatic pains in her limbs. These pains continuing, she became exceedingly feeble; and they were increased after a fall, in consequence of which she was confined to her room. In April, 1842, two months after the fall, when her husband was lifting her into bed, both her thigh-bones were broken.

Mr. Solly thus describes her condition in October, 1843 :—

“ I do not perceive anything abnormal in the appearance of the bones of the head or face. The countenance is emaciated. There is a lateral curvature of the spine; in the dorsal region the convexity is to the right . . .

“ In the centre of the lumbar region the spine curves forwards, the inferior vertebræ with the upper portion of the sacrum projecting backwards. The lower portion with the coccyx turns suddenly forwards, forming almost an acute angle.

“ On the left side the ribs project backwards to their anatomical angles; from that point they are bent directly forwards, forming an acute angle, which projects posteriorly; . . . the side of the thorax from the angles being flattened or slightly concave, and the lateral diameter of the chest much diminished in consequence. This latter deformity has evidently been produced by her lying altogether on the left side, either on a pillow or on her arm.

“ The clavicles have both been fractured and re-united, and are bent at a right angle in the centre. The bones of the arm and hand are all natural. I could not examine very accurately the ilia, but they were evidently folded inwards.

“ Both thigh-bones are broken. The lower portion of the left is twisted round, so that the patella faces inwards. . . . The right thigh is bent completely at an acute angle in the centre; the lower portion turned outwards. The tibia and fibula of both legs, and the rest of the bones, appear quite healthy.”

On April 15th, 1844, Mr. Solly writes, “ The disease has been progressing, though not very rapidly.

“ The countenance is rather more emaciated, and both maxillæ appear narrowed from side to side. The alveolar cavities of the superior incisor teeth are softened, allowing them to protrude forwards, and she is not able to bite with them. The right humerus has given way in the centre, and the arm lies perfectly useless on the bed. It cannot be moved without giving her great pain. The radius and ulna are not apparently altered, but the metacarpal bones and phalanges are quite soft. The whole hand is rather swollen and puffy, and its natural appearance changed.

“ The thorax is much narrower. On the left side there is a depression about the circumference of an orange, the centre of which is occupied by the fifth rib, about an inch and a half from its junction with its cartilage; in this depression the action of the heart can be distinctly seen and felt.”

On the 20th of April the patient died suddenly with painful dyspnœa. On examination after death, all the bones of the left upper and lower extremities presented, in different degrees, the changes of structure shown in this specimen; on the right side the femur was similarly affected, the radius and ulna were broken, and the other bones were affected in less degrees. The skull was soft and very vascular, but not thickened; sections presented an “ open, reticulated texture ” like that in No. 395. The vertebræ, ribs, and sternum were affected like the bones of the extremities. One of the kidneys contained in its pelvis a large calculus of phosphate of lime; and the urine passed by the patient shortly before her death contained a large excess of the same salt. In the original paper are accounts of the microscopic examination of the red

matter from the skull and vertebræ. Other specimens from the same patient are in the Museum of Saint Thomas's Hospital.

Presented by Samuel Solly, Esq.

404. A clavicle, the middle of which, having become soft, yielded to the weight of the arm, and to the contraction of the muscles above it. The shaft is bent to an angle of about 120° , the apex of which is directed upwards. At the angle the shaft is slightly enlarged by the formation of a ring of new bone around it.

From the Museum of John Howship, Esq.

Principal specimens of Atrophy of Bone in other parts of the Museum :—

Nos. 7, 8, 10, 593-4, 713, 798-9, 975-6, 2845 to 2864, 2934, 3228 to 3231; all the bones, except those of the Skull, of 3489; 3498 to 3502.

The specimens of Rickets in which, though their forms are distorted, the bones have regained a natural texture, are from Nos. 2865 to 2880.

3. *Fractures and other Injuries of Bone.*

The specimens of Injuries of the Bones are arranged in two sections, to illustrate, 1st, The pathology of such injuries in general, and 2ndly, That of such injuries in each bone or chief portion of the skeleton.

In the former of these sections, including the specimens from No. 405 to No. 479, are placed, first, such as exhibit the ordinary process by which, in favourable circumstances, fractures are repaired. These are, for the most part, arranged according to the stage which the process of repair has attained; but the order is interrupted for the purpose of separating and grouping the specimens in which the repair is effected by means of a "provisional callus," *i. e.* a quantity of cartilage or bone encircling or ensheathing the fragments.

There is scarcely a specimen in the Museum of such a provisional callus formed in the repair of a fractured human bone; in nearly every case of such fracture, the material of repair, whether cartilage or bone, is only inlaid between the broken surfaces, or between the adjacent parts of the fragments, and unites them by being fixed to both. In favourable conditions, this appears to be the usual mode of repair, even though the fragments of the broken bone be very much displaced, as in Nos. 437 to 445, and 454.

But the formation of a provisional callus, completely encircling the broken ends and adjacent parts of the fragments, is usual in the repair of fractures of the bones of other mammalia, and of birds; and the specimens from 418 to 426 show the process of formation and development of such callus. A similar, but less perfect, process is also shown in the accumulations of cartilage, or bone, which are often formed about fractures of the ribs, and of some other bones in the human subject, the fragments of which have not been held steady. It is probable, therefore, that the difference between the modes in which fractures are commonly united in man and in other animals, respectively, depends in part on the movement to which the fragments are subjected in the latter; but probably, in part also, on the greater readiness with which, under all circumstances, bone is formed in the animals lower than man.

After the illustrations of the ordinary union of fractures are placed some specimens of Callus, the material of repair, Nos. 433 to 436. And after these are two groups, of which the first, from 437 to 459, contains the specimens of deviations from the ordinary process of union, in consequence either of displacement, comminution, or detachment of the fragments, or of subsequent disease, or other accidental circumstances occurring after the injury;* and the second, from 460 to 470, contains those specimens in which the process of union has completely failed.

The section is concluded by the specimens of gun-shot and other wounds of bones; from 471 to 479.

In the second section, from 480 to 551, including the fractures of each of the several bones of the skeleton, no other arrangement is observed than that usually adopted in describing the skeleton; those fractures of each bone being placed together, which, either in their situation, or otherwise, most nearly resemble each other.

The specimens in the dry state, preserved in the Floor Cabinets, are, also, all arranged on the plan of this second section.

* The specimens in which fracture has occurred in bones previously diseased, including the numerous varieties of the so-called *spontaneous fractures* and *fragilitas ossium*, are arranged, according to the nature of the previous disease, under the heads of atrophy, necrosis, cancer, and other affections of the bones. See Nos. 387-9, 398, 400-1-2-3 A, B, C, 704, 713, 803, 818-9, 822-3, 838, 843, 849, 858, 1056, 1058, 2854-5, 2861-2-3-4, 3253-6-7-8.

SERIES XII.—Sub-Series 3.—Section A. REPAIR OF FRACTURES IN GENERAL.

a. *The Ordinary and Simple Process of the Repair of Fractures.*

405. "A fracture of the os humeri, bristles put into the coagulated blood."—*Hunterian MS. Catalogue.*

It is probably to this preparation that the following passage in Duncan's Medical Commentaries, Lond. 1775, vol. i., 8vo., p. 322, refers. It is appended to a letter from Mr. Cruickshank to Dr. Duncan, in which he relates Mr. Hunter's opinions respecting puerperal fever:—

"We formerly gave a short view of his (Mr. Hunter's) opinion respecting the blood being possessed of a living principle. We are now informed that he is every day more satisfied of its being well founded. Among other particulars the following circumstance has served to confirm him in it:—A man was brought to St. George's Hospital with a simple fracture of the os humeri, and died about a month after the accident. As the bones had not united, Mr. Hunter injected the arm after death. He found that the cavity between the extremities of the bones was filled up with blood that had coagulated. The blood was become vascular; in some places it was very much so."

406. The other portion of the same humerus.

407. Part of a femur, fractured obliquely at the junction of the middle and lower thirds. The upper portion projects downwards behind the lower. The ends of the bones are enclosed in an irregular cavity, bounded by the muscles and cellular tissue of the thigh, and thickly lined by lymph. The cancellous tissue at the fractured extremities also appears filled by lymph or coagulated blood. A quill is passed through a canal leading from the popliteal space to the cavity around the ends of the bone.

Hunterian.

408. Section of a fractured tibia. The portions of the bone are rather widely separated, and the space between them is filled by a soft vascular sub-

stance. The blood-vessels have been injected. The muscles and other tissues adjacent to the fracture appear indurated and confused. *Hunterian.*

409. A vertical section of the lower end of a tibia. A compound fracture extended, by a vertical fissure, into the ankle-joint. In the plane of the fracture through the bone, there is a thin layer of pale soft tissue, in which bristles are set: while, over the fracture through the articular cartilage, is a thin membranous layer of lymph. *Hunterian.*
410. The other section of the same tibia, showing similar changes, with a somewhat wider separation of the fragments. *Hunterian.*
411. The lower ends of a tibia and fibula. A fracture extended through the tibia into the ankle-joint. The cracks through the articular cartilage of the tibia are filled with a firm substance like lymph; and parts both of this cartilage and of that covering the inner surface of the external malleolus have been removed by ulceration. The bone thus exposed is smooth and hard; the adjacent edges of the cartilage shelve towards the bone. *Hunterian.*
412. A vertical section of the lower part of a femur, which was fractured just above the condyles, forty-two days before the patient's death by apoplexy. The periosteum, a part of which has been reflected, is nearly a quarter of an inch thick, and forms the chief bond of connection between the fractured portions. Lymph is effused within and upon their extremities.
413. Another section of the same femur. The fractured surfaces of cancellous tissue are connected by a thick layer of compact fibrous-looking substance, and the part adjacent to the fracture is filled by lymph.
414. Another section of the same femur exhibiting similar appearances. Here, also, a portion of cancellous tissue, which had been completely separated, is united to the others by fibrous substance.
415. Another section of the same femur, including part of the wall of the

bone. The bonds of union are, a tough fibrous-looking tissue, a layer of which intervenes between the adjacent surfaces of the walls, and the thickened periosteum which passes from one portion to the other.

In the interval between the accident and the attack of apoplexy the general health of the patient, a man sixty-six years old, had not been affected.

Presented, with the three preceding Preparations, by Joseph Swan, Esq.

416. Portion of bone removed, with a trephine, from a boy's skull. It is traversed by a fracture, the edges of which are united by a soft substance.
Hunterian.

417. Sections of the humerus of an ostrich, fractured transversely through its shaft. The interior of the bone, for nearly an inch above and below the fracture, is filled by a soft substance, apparently organized lymph; its exterior is unaltered.
Hunterian.

- 418, 419, 420. Sections of three tibiæ from rabbits, showing the process of repair by provisional callus, at the periods of six, ten, and fourteen days after the injury. The portions of bone are, in all the cases, widely displaced, and overlapping. In all, their ends are ensheathed in a firm vascular substance, which, in the fracture of the longest date (No. 420), has assumed the appearance of compact fœtal cartilage. In the first two specimens, the periosteum is continued over, and adherent to, the surface of this substance, the seat of which is thus shown to be between the periosteum and the bone.

From the Museum of Sir A. P. Cooper.

421. Part of a fractured rib, labelled in the hand-writing of Mr. Hunter, "The extravas. blood has died and absorb'd. The adhesive inflam. in the surrounding parts is forming the union." The broken ends of the rib are in apposition, and an irregular ring of new bone is formed round each of them; but the two rings have not coalesced so as to form a bond of union like a "provisional callus" encircling the fractured part; neither has any union taken place between the bones themselves.

It deserves notice that here, as in other cases, Mr. Hunter pointedly distinguishes the union of parts by adhesion in consequence of inflammation, from that which, more naturally, takes place (as he believed, by the organization of the effused blood) without inflammation.

422. Section of the ulna of a fowl fractured obliquely through the distal part of its shaft. The broken extremities are rather widely separated, but are held together by a firmly attached ring of cartilaginous and osseous substance, irregular in its form, and from half an inch to an inch in width. The interior of the bone near the seat of fracture is filled with a firm substance, but its walls appear to have undergone no change. *Hunterian.*

423. A longitudinal section of a transversely fractured rib, from a pig. The fractured portions are held close by "provisional callus;" a large nodulated mass of new bone being formed, like a ring, encircling their adjacent extremities, and holding them together. There is no union of either their walls or their cancellous texture; and the line of fracture by which these are still separated is prolonged through a great part of the thickness of the surrounding new bone, as if ossification had taken place last in the part of the callus immediately surrounding the plane of fracture, and, therefore, least fixed in its position.

From the Museum of Sir A. P. Cooper.

424. Part of a rib (from a small mammal), fractured and re-united, with a great accumulation of bone around the injured part. The surface of the new bone, or provisional callus, is marked by an irregular circular groove, indicating, as in the preceding specimen, that the ossification of the callus is incomplete round the plane of fracture. *Hunterian.*

425. Section of a long bone fractured transversely. The fractured ends of the bone are held in exact apposition by an encircling ring of osseous substance, half an inch wide and firmly united to them. The cancellous tissue near the seat of the fracture is filled by a compact bone-like substance; but the line of fracture across the wall of the bone is still distinct, and partially open. *Hunterian.*

426. The radius and ulna of a small bird. The ulna was obliquely fractured through the middle of its shaft. A section through the seat of the fracture shows the two portions in exact contact, and ensheathed in very compact osseous substance, which extends for more than half an inch above and below the fracture. The tube of the bone is in both portions filled by a similar substance; but the line of fracture is still discernible across the shaft.

From the Museum of George Langstaff, Esq.

427. Section of a fractured humerus, of which the blood-vessels have been minutely injected, and which has been dried after the removal of its earthy matter by some acid. For more than an inch above and below the seat of fracture the interior of the shaft is filled by a compact and vascular substance, and on a part of its exterior is a thin layer of porous and vascular osseous tissue, which has completely coalesced with its wall. The line of fracture is not discernible.

Hunterian.

428. An oblique section of one of the portions of a fractured bone, similarly prepared. The wall of the bone appears surrounded by a thick layer of porous and vascular osseous substance.

Hunterian.

429. Section of a fractured tibia, similarly prepared. The continuity and form of the wall of the bone are completely restored, but the substance in the cancellous tissue appears more compact at the seat of fracture than elsewhere.

Hunterian.

430. A right clavicle, fractured through the middle of its shaft, and so completely repaired that there is but a trace of the injury.

Hunterian.

431. Sections of a tibia in which a fracture of the lower part of the shaft has been completely repaired, the wall being continuous, and of equal thickness throughout, and the cancellous tissue presenting its natural characters at the seat of fracture.

From the Museum of Sir A. P. Cooper.

432. Section of a humerus, in which a fracture of the lower part of the shaft has been completely repaired. The portions are in almost exactly their true position; the repaired wall on one side is a little thickened; the cancellous tissue has its natural appearance.

From the Museum of Sir A. P. Cooper.

B. *Structure of Callus.*

433. A section of "cartilaginous callus," of which the vessels have been minutely injected. The greater number of the vessels displayed belong to the muscles and other tissues consolidated round the seat of fracture.

434. Section of callus from the neighbourhood of a fracture, injected and dried. Two small isolated portions of bone are formed in it. *Hunterian.*

435. A similar preparation, in which the callus is more extensively ossified. *Hunterian.*

436. Section of callus, with a portion of periosteum, from the neighbourhood of a fracture. Bone is formed in the lower part of the callus. *Hunterian.*

c. *Deviations from the ordinary process for the Union of Fractures, in consequence of Displacement, Comminution, or Detachment, of the portions of bone, subsequent Disease, and other accidental Circumstances.*

437. A humerus, which was fractured at the junction of the middle and lower thirds of its shaft. The portions were rather widely displaced, but the adjacent parts of their extremities are firmly and smoothly united by new bone formed between them. The overlapping ends are reduced in size; and at the end of each fragment the medullary tube is covered by a layer of compact bone. *Presented by Sir William Blizard.*

438. Section of the tibia of a middle-aged woman, which was fractured through the junction of its middle and lower thirds sixteen weeks before death. The ends of the two portions overlap each other nearly an inch, and are firmly united by new bone formed between those surfaces which, in their overlapping, were opposed to, and nearly in contact with, each other. No new bone or callus is formed at any other part. The periosteum and other tissues near the bones appeared healthy, except in having small effusions of blood in them. *Presented by William Lawrence, Esq.*
439. A transverse section of a fractured femur, in which the portions are united, one lying upon the other. The adjacent and opposed surfaces of the two portions are united by an intermediate mass, or bridge, of coarse cancellous bone. *Hunterian.*
440. The humerus of a vulture, fractured just below the middle of its shaft. The extremities of the portions were displaced nearly an inch from each other, but have been united by a strong smooth bridge of bone. *Hunterian.*
441. Two transverse sections of the shaft of a femur which was fractured, and whose portions united, overlapping each other. The sections, like the preceding, show that, in these cases, each portion of the shaft retains its usual characters, and that the union is effected by bone formed between their adjacent surfaces, and coalescing with both of them. In the new bone, also, there is formed, in this instance, an outer compact wall continuous with the sides of the walls of the shaft, and an internal cancellous tissue exactly similar to that of the shaft, with which, in the lower section, it has coalesced. *Presented by Sir William Blizard.*
442. Transverse sections of the left femur of a fowl, which was fractured near the middle of its shaft. The lower portion was drawn backwards, and more than half an inch upwards, and was turned half round; but it has been firmly re-united by an intermediate mass of bone, composed like the

bonds of union in the preceding cases. The parts of the medullary tube exposed by the fracture are closed by smooth hard layers of bone.

Hunterian.

443. Longitudinal sections of the humerus of a turkey, which was fractured just below the middle of its shaft. The extremities of its portions were much displaced, but have been united by a strong bridge of bone, formed of cancellous tissue continuous with that of the two portions of the shaft, and invested by a thin layer of compact tissue continuous with the walls of the shaft.

Hunterian.

444. Section of the lower end of a fractured tibia, injected, softened in acid, and dried. There was considerable lateral displacement of the portions of bone, and only the halves of their fractured surfaces have united. To this extent, however, the union is complete, and the line of fracture across the cancellous tissue is scarcely discernible.

From a case of compound fracture. "The sore" [consequent on the protrusion of the bone] "never would heal; nor could the man ever bear any weight upon it; probably from its having united by so small a surface; the limb was therefore amputated."—

Hunterian MS. Catalogue.

445. Part of a femur, which was fractured transversely through the middle of the shaft. The portions were much displaced, the lower being drawn behind the upper; and they now form an angle of about 150°. The extremity of the lower portion is fixed to the posterior surface of the upper one, a full inch from its lower end, which has undergone no further change than a slight rounding of its fractured edges. The bonds of union consist of two broad bridges of bone extending from the end of one, to the sides of the other, portion.

Presented by Sir William Blizard.

446. A femur in which there has been a compound fracture at the upper part of its shaft. The upper portion was placed nearly an inch in front of the lower one, and overlapped it nearly two inches; but they are united by two

lateral bridges of light spongy bone. The medullary tube is not closed at either of the fractured ends. The whole bone is very light. *Hunterian.*

447. The femur of a fowl, which was fractured in two places below the middle of its shaft. The portions have united firmly with a great accumulation of bone; but the lowest portion has fallen, and been turned downwards and backwards, so as to form an acute angle with the upper portion.

Hunterian.

448. Part of a fractured tibia. The portions are united by a soft substance; and a fragment, detached and pushed behind the others, is firmly fixed in the soft tissues around the bone.

Hunterian.

449. Section of a tibia which was fractured about four inches above the ankle, three months before the patient's death. The union is very imperfect. New bone, of light texture, has been formed around the extremities of both portions; but none has been produced between them, and they are held together only by part of the periosteum, and by a soft substance formed in the line of fracture. A portion of the wall, completely separated and pushed outwards, is united by a soft substance to the adjacent part of the shaft.

The patient was forty-eight years old. A wheel passing over his leg produced a comminuted fracture of both the bones. Common splints not serving to prevent the retraction and drawing upwards of the lower fragments, Desault's splint was applied; and with this the limb remained quiet, and the apposition of the fragments appeared complete. Ten weeks after the injury the patient was attacked with fever; and this was followed by erysipelas of the face and head, with which he died.

From the Museum of John Howship, Esq.

450. Section of the femur of a cock, in which, after it was broken into three pieces, the upper portion was widely displaced. The two lower portions have firmly united by bone, and the space between them and the upper portion is filled by a tough fibrous-looking tissue, by which they are securely held together, and in which there is a small isolated portion of newly formed bone.

Hunterian.

451. The other section of the same femur. *Hunterian.*
452. A vertical section of a radius, in which there was a compound fracture. The two portions are wide apart, but are united by a large quantity of tough ligamentous substance. In the middle of this substance is part of a cavity in which was a small detached portion of bone. *Hunterian.*
453. The other section of the same radius, together with the detached piece of bone between the ends of the fractured portions. *Hunterian.*
454. A left femur, fractured almost vertically through the middle of the great trochanter, and very obliquely just below the middle of its shaft. In the situation of the former fracture, the parts have firmly re-united; but the part of the trochanter major, which remained with the head and neck, was drawn upwards, and a little backwards, so that the axis of the neck was horizontal; and a broad cleft was left between the two portions of the trochanter, which cleft is nearly filled by new bone. In the lower fracture, also, the parts are firmly re-united, though with much shortening and distortion. A splinter, five inches long, and nearly an inch wide, was at this part broken from the outside of the femur, and this "splinter having by some extraordinary circumstance been turned round on its bone, so that it must have been quite detached, its periosteal surface is laid on that of the bone, and the internal or reticular surface presented to the muscles; but what is extraordinary is, the strong bony attachment by which it is fastened to the original bone, when, from the change it had suffered in its situation, it must have been entirely detached."*
- Hunterian.*
455. The upper part of a right femur, fractured vertically through the base of the neck and the great trochanter. The shaft is drawn up, so that the great trochanter is above the head; but the fractured surfaces have united

* "Hunterian Reminiscences, being the Substance of a Course of Lectures delivered by Mr. John Hunter, in the year 1785." Edited by J. W. K. Parkinson, &c., London, 4to., 1833, p. 111.

firmly, and an exceedingly large quantity of new bone is accumulated upon and around the trochanters. The neck of the femur is not shortened, nor altered in form.

Hunterian.

456. A fore-arm and hand in which a compound fracture of the radius and ulna occurred five months before amputation. Both bones are protruded through the skin, and surrounded by granulations and sloughs. The ulna projects about three inches. Nearly one inch of its protruded extremity has perished, and a line of separation is formed between the dead portion and the upper part, which, though projecting so far beyond the skin, appears to have retained its vitality.

The patient was a Lascar. A top-mast fell on his arm while at sea, and produced this compound fracture, which was at once tightly bound up (there being no surgeon on board the vessel), and so remained till, five months afterwards, he arrived in London. Amputation was immediately performed, but he died exhausted.

Presented by Sir William Blizard.

457. A tibia and fibula, which were fractured between three and four inches above the malleoli. The upper portions are thrust downwards, so that their extremities are nearly at the level of the ankle-joint, and the articular surfaces of the lower portions are turned obliquely outwards. The several portions are, however, united by strong bridges of bone passing between their nearest surfaces. A piece of the anterior wall of the tibia, nearly five inches in length, has necrosed, and is separated. The adjacent part of the shaft is covered by irregular pointed processes and plates of new bone.

Presented by Sir William Blizard.

458. The femur of a young subject, in which a transverse compound fracture occurred near the junction of its middle and lower thirds. The upper portion of the bone lies in front of the lower one, and extends over it more than three inches: nearly the whole length of the portion thus displaced has perished, and is surrounded by a broad and deep groove. The greater part of the rest of the shaft is thickly covered with new bone,

from which a broad process extends more than an inch backwards, and unites the posterior part of the upper portion with the top of the lower one. On this lower portion, also, some small pieces have perished, and were being exfoliated. *Hunterian.*

459. A femur, tibia, and fibula, fractured and united with great distortion. The femur was fractured transversely across the middle of its shaft, and its two portions are widely displaced, the lower being drawn upwards behind, and to the outer side of, the upper one. They are held together by a strong bridge of new bone, extending across the angle which they form. The fractured ends themselves are not united; they are rendered irregular by deposits of new bone, and by the exfoliation of large portions of their walls.

The tibia was fractured at the junction of the upper and middle thirds of its shaft. Its portions are united with slight lateral displacement, and a long piece of its posterior wall has exfoliated, and lies between the fibula and the remainder of the shaft of the tibia.

The fibula was fractured about three inches below its upper end. Its portions are not united, but a considerable quantity of new bone is formed upon their surfaces near the seat of fracture. Nearly two inches of the lower part of the fibula were completely removed. The external malleolus, however, remains.

The patient, a boy 14 years old, was entangled by machinery, and several other bones besides these were fractured. He died three months after the reception of the injury.

From the Museum of Robert Liston, Esq.

c. Fractures which have remained long unrepaired, forming False Joints.

460. Section of a tibia fractured transversely through the lower part of its shaft. The broken ends are closely approximated, though the upper portion is thrust in some degree outwards. No union has taken place between them :

the cancellous tissue near the fracture is filled by a firm substance, and a small quantity of new bone has been formed on the surface of the wall. A portion of the wall of the bone, completely detached, is interposed between the fractured surfaces. *Hunterian.*

461. The right humerus of an ostrich, which was fractured just above the lower third of its shaft. The portions are not united, but the end of each is enlarged, by the accumulation of new bone around it, into a smooth oval mass of compact bone more than twice the natural diameter of the shaft. *Hunterian.*

462. Part of a humerus, fractured obliquely, and of which the portions are not united. The extremities of both portions are much enlarged; their surfaces are covered by a smooth fibrous tissue; the surface of one is convex, of the other concave. They are exactly fitted to each other; and are held close together by a tough fibrous tissue forming a kind of capsular ligament, of which half has been removed.

Presented by G. E. Ewbank, Esq.

463. Part of a femur, which was fractured near the junction of the upper and middle thirds of its shaft. New bone has been deposited abundantly about the end of the lower portion, to which also a smaller piece of the femur appears to be united after having been detached and displaced. A smaller quantity of new bone has been formed on the end of the upper portion. No union, however, has been effected. The broken ends appear to have been in contact at the part where there is now a nearly flat oval surface covered by a substance with a cartilaginous aspect; they were held together by a tough fibrous substance, in which there is an irregular plate of bone.

From the Museum of John Heaviside, Esq.

464. Sections of the humerus of a large monkey, fractured across the middle of the shaft. The portions were displaced, so that the fractured surfaces were not in contact; and no union has taken place between them. The broken ends are smoothly rounded, and held together by a tough fibrous tissue,

forming a kind of capsular ligament round the cavity between them. Processes of the same tissue are also continued over parts of the fractured surfaces. The blood-vessels have been injected. *Hunterian.*

465. Parts of the femur, tibia, and fibula, of a large dog. The femur was fractured just above the condyles, and the portions are not united. The extremity of the upper portion, projecting forwards, is covered with fibrous tissue, which has an uneven polished surface, and which rested on the upper and anterior part of the lower portion. The portions were held together by a kind of capsular ligament, which is now laid open, and which permitted a free motion between them. The lower portion is fixed to the tibia; behind it is a piece of dead bone, which lay in a fistulous passage opening externally. *Hunterian.*

466. Parts of the humerus, radius, and ulna of a dog. The humerus was transversely fractured near its lower extremity three months before death. Its portions, though but slightly displaced, are not united; their extremities are enlarged by the formation of bone around them, and the fractured surfaces are covered with a tough fibrous tissue. A similar tissue, forming a kind of capsular ligament, maintains the fractured portions in close apposition. The elbow joint is almost immoveably ankylosed.

From the Museum of George Langstaff, Esq.

467. Portions of a radius and ulna, fractured transversely across the middle of their shafts. The upper portions project forwards and downwards, and their extremities are an inch distant from those of the lower portions. All the fractured ends are reduced in size, and their margins and surfaces are smoothly rounded, and covered in by compact tissue. Around each of them is a separate and distinct cavity, resembling a large *bursa mucosa*, with tough fibrous walls, and a polished internal surface.

Presented by William Lawrence, Esq.

468. Part of the humerus of an ostrich, in which, after a fracture, the two portions were widely displaced, and are not united. Their extremities are

smoothly rounded, and the space between them is occupied by a sac, like a large *bursa mucosa*, formed of dense fibrous tissue, and lined by a polished membrane. This sac, however, does not enclose the fractured ends of the bone, but is interposed between them, its outer walls being fixed to their adjacent surfaces. *Hunterian.*

469. Part of a humerus fractured four or five years before death, at the junction of its middle and upper thirds. No union was effected.

The case is detailed as follows, in "Some Observations on the loose Cartilages found in Joints," &c., by Everard Home, Esq., F.R.S., &c.; in the "Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge," vol. i., p. 233, London, 1793. It was intended as an illustration of Mr. Hunter's views respecting the origin of loose cartilages, and is published in his Works, vol. iii., p. 627.

"A man, sixty-eight years of age, was brought into St. George's Hospital, on the 20th of March, 1791, with a simple fracture of the right thigh-bone. The fracture was situated about three inches below the great trochanter; it was treated in the usual manner, but no bony union had taken place in the beginning of June, about eleven weeks after the accident, the portions of bone at that time being readily moved on each other. There being nothing in the man's general health to account for this backwardness in the parts to unite, he was desired to explain whatever circumstance he was acquainted with respecting himself, likely to throw any light upon it. This inquiry lead the patient to mention, that his right os humeri had been broken three years and nine months before, but that the bones had continued disunited, and admitted of motion more freely at that time than immediately after the accident.

"Rest having proved ineffectual in producing union in the thigh, and it being evident, from the circumstance of the arm, that there was a natural backwardness in the constitution to form bony union, he was directed to walk upon crutches, and to press as much upon the broken thigh as the state of the parts would admit, without considerable pain, with a view to rouse the parts to action, forcing them, by a species of necessity, to strengthen the limb.

"In the course of a fortnight there was an evident firmness in the bone, and in less than two months the patient could walk with the assistance of a stick.

"As there was something uncommon in the case, he was allowed to remain in the hospital to acquire strength; in this convalescent state he was seized with a complaint in his bowels, which was very violent, and carried him off.

"After death the thigh-bone was found firmly repaired by bony union, but the bone of the arm, an account of which is more immediately to the present subject, admitted of motion in every direction at the fractured part. The arm was carefully dissected, to examine the state of the fractured parts, between which there was no callus, but a large bag filled with a glairy fluid, resembling synovia. The internal surface of this bag was smooth, like a capsular ligament, and its attachment to the bones was of the same kind:

it adhered firmly to the surrounding parts, which were thickened and consolidated, rendering it very strong. The two ends of the bone were adapted to each other, all the irregularities having been absorbed; and their surfaces were of considerable extent, from the fracture being oblique; the upper one was slightly concave, or rather had two depressions, with a middle ridge; the lower one was smaller and rounded, and was adapted to both concavities, which received it in the different motions of the parts. The surfaces of the bones fitted for motion were not completely covered with cartilage, but studded over with it, and the bone was exposed in the interstices; a number of projecting parts, covered with cartilage, grew out from the surfaces, some exceedingly small, others large. From the edges of the bones and the capsular ligaments, these excrescences were larger, extremely irregular in their shape, broader in their attachments, softer in their texture, and serrated upon the external edge. Thirty or forty small substances, similar to those above mentioned, were found loose in the cavity, varying in size from that of millet-seed to that of a barley-corn, of a roundish form, and smooth on the surface; the largest of them were more flattened, and serrated. Their hardness varied considerably, some of them being as soft as cartilage, others so solid as not to be pierced by a needle. Those bodies must have been originally attached, and broken off by the friction of the parts on one another.

“ The preternatural cavity which I have described was in its nature and use similar to the naturally formed joints of the body; these excrescences and loose bodies were its principal peculiarities, the formation of which appears to have been the result of the violence committed on the parts previously to the formation of the joint; and may be explained in the following manner:—

“ When the bone was broken, the ruptured vessels poured out their contents into the interstices of the lacerated parts, for the purpose of uniting them again; this, however, not taking place, it was necessary to accommodate the parts to their disunited state: to this end the blood, which had now become useless, was in part absorbed, and the new joint formed. The remains of the coagulated blood which had not given the stimulus for its own absorption, underwent changes in its nature, assimilating it as much as possible to that of the surfaces to which it was attached, in some parts its texture resembling ligament, in others being more allied to cartilage or bone.

“ When we compare these substances with the loose cartilages found in the knee-joint, which are also produced in consequence of accidental violence, and similar in their appearance, we are naturally led to conclude that the latter originate from extravasations of blood, altered in its nature by the parts in which it is deposited, similar to those in the artificial joint above described. In both cases they are evidently new-formed substances, and the readiest mode by which we can account for their production is to refer them thus to the blood, from which fluid every part of the body was originally formed.”

470. The loose bodies which lay in the cavity round the fractured ends of the bone in the preceding preparation. *Hunterian.*

Other specimens from the same cavity are in No. 320, described in vol. i., p. 144.

Specimens of ununited fractures in other parts of the Museum :—

Nos. 486, 488, 498 to 519, 535 to 542, 547, 550 ; most of the specimens of Spontaneous Fracture referred to at page 38 ; and Nos. 2934-5, 2943-6-7, 2953, 2960-5, 2993-5, 3002.

4. *Gun-Shot and other similar Injuries, including Wounds, of Bones.*

471. Part of the frontal bone of an elephant, in which a bullet, flattened and misshapen, is lodged in the frontal cells, and is tightly fixed between the walls of two of them. The aperture at which it entered is larger than itself, and has undergone no repair.

Presented by — Evans, Esq.

472. Part of the humerus of a king vulture (*Vultur Papa*), by the side of which, just above the condyle, a bullet is tightly fixed upon a sharp-edged and pointed process of bone. The bullet was partly cleft by the edge of the bone. The upper end of this portion of the shaft also appears to have been broken, for its medullary tube is closed.

From the Museum of Joshua Brookes, Esq.

473. The lower half of a femur, in the inner condyle of which a bullet, having entered through the front of the knee-joint, is lodged. A cavity has been formed, in which the bullet now rolls loosely, and which opens posteriorly by an oblique canal passing through the back of the shaft. A small quantity of new bone is formed upon the condyles, and their articular surfaces appear ulcerated.

From the Museum of Robert Liston, Esq.

474. Part of a femur which was fractured by a bullet in its middle third. The bullet remained between the fractured portions ; but they are united, with shortening and distortion, by broad and strong bridges of bone passing from one to the other. A large round cavity, from which the bullet was at last removed, remains in the middle of the bonds of union. The surface

of all the bone by which the fracture is united is rough, like that of bone that has been superficially ulcerated. *Hunterian.*

475. The metacarpal bone of an ass, through the middle of the shaft of which a small hole was bored long before the death of the animal. The walls of the shaft around the hole are considerably thickened by new bone formed on their surface. New bone has also been formed in a very thin layer on other parts of the shaft. *Hunterian.*

476. Sections of the metacarpal bone of an ass, through which a similar but larger hole was bored in the upper part of the shaft. Similar changes have ensued on the exterior, but the medullary tube appears unaffected. *Hunterian.*

477. Sections of the metacarpal bone of an ass, similarly bored through the middle of its shaft. They exhibit a greater increase of thickness of the wall around the apertures, in consequence of new bone formed on its surface and closely united with it. That part of the medullary tube which immediately surrounds the passage through it is also nearly filled up by new bone. *Hunterian.*

478. A transverse section of the metatarsal bone of an ass, showing similar changes. *Hunterian.*

There is no record of the intention with which the experiments shown in the last four preparations were made. The specimens are placed here because the injuries inflicted on the bones resemble gun-shot and other penetrating wounds more than they do any other accidental injuries of bones. Possibly, the experiments were made to examine into the changes which have taken place in the following specimen: but of it no history is recorded.

479. The lower half of a young person's tibia, from which a portion of the inner wall exfoliated after necrosis. The dead bone is encompassed by a broad shallow groove, formed by ulceration through a layer of new bone, which covers the greater part of its surface as well as that of the adjacent living bone. An aperture in the centre of the dead piece of bone

leads to a canal which traverses the whole thickness of the shaft from before backwards, and is like the track of one or more small shot.

Hunterian.

Specimens of gun-shot and other wounds of the bones in other parts of the Museum :—

Nos. 70, 986, 2049, 2889 to 2899, 2900-1, 2916-8, 2920, 3359.

SERIES XII.—Sub-Series 3.—Section B. FRACTURES OF PARTICULAR BONES.

480. Part of a parietal bone, in which there has been fracture, with depression of one margin of the fractured portion. The depressed margin, together with the pericranium attached to it, has been pushed under the edge of the adjacent bone.

From the Museum of Sir A. P. Cooper.

481. Part of a parietal bone in which a fracture, with depression of a circular portion about three-fourths of an inch in diameter, has been completely healed. The depression is to an extent of nearly one-fourth of an inch below the level of the inner table. The line of the fracture, which appears to have been starred from the centre of the depressed portion, is scarcely discernible.

From the Museum of George Langstaff, Esq.

482. A frontal bone, in the middle and upper part of which a fracture, with depression, occurred. The depressed portion is about an inch and a half in diameter. Through the external table a fissure seems to have extended completely round the depressed portion: the internal table was fissured through the greater part of the same circumference, and, besides, in three lines radiating from its centre. All these fissures, as well as others which pass through the external table, from the circumference of the depressed portion towards the external angular processes of the frontal bone are so

united that their course is indicated only by a narrow depressed line with a few small circular pits. The outer surface of the depressed portion is smooth, but perforated by an unusual number of vascular canals.

From the Museum of Joshua Brookes, Esq.

483. A right temporal bone, which was fractured two years before the patient's death, together with part of the occipital bone. The line of fracture passes nearly straight downwards, through the squamous portion of the temporal bone, to the upper margin of the meatus auditorius externus; thence it proceeds along the upper wall of this passage, a part of the anterior wall being destroyed, and opposite the cavity of the tympanum it branches in two directions: by one of these branches, the fracture extends through the posterior and lower border of the petrous portion of the bone into the jugular fossa, which it completely traverses; by the other, it extends through the upper border of the same portion of the bone; and there is a considerable loss of substance near the outer wall of the skull. That part of the fracture which lies in the squamous portion of the bone is, with the exception of a few minute apertures, closely and smoothly united; but, in the part which traverses the petrous portion of the bone, there are only two or three small points at which union has taken place.

The patient was an engineer. After the injury he was in St. George's Hospital with symptoms of fracture of the base of the skull, from which, however, he recovered, and returned to his work. Two years afterwards he was thrown from a railway-carriage, and killed by fracture of the cervical vertebræ.

Presented by Henry Lee, Esq.

484. Several portions of a skull removed after a fracture received in a fall.

The patient recovered from the injury.

Presented by Sir Everard Home.

Specimens of fractures of the bones of the skull and face, and of the effects of injuries of the head, in other parts of the Museum:—

70, 2046 to 2049, 2096-7, 2881 to 2903.

The injuries of the vertebral column are placed, together with its diseases, in a separate series; from No. 977 to 986.

485. Portions of three fractured ribs. The broken extremities are slightly displaced, and no union has been effected. *Hunterian.*

486. Part of the fractured rib of a cow, of which the broken portions have been partially united by new bone formed on their adjacent margins. *Hunterian.*

Fractures of the ribs in other parts of the Museum :—
421-3-4, 2904 to 2914.

487. The pelvis of a rabbit from which, in an experiment for determining whether, after fracture of the pelvis, loose portions of bone should be removed, the symphysis pubis was divided, and “a portion of the right os pubis, about one-twelfth of an inch broad, was removed in the direction of the symphysis. The edges of the wound in the skin were brought together by one uninterrupted suture. The animal appeared to recover very well, but its hind legs were ever after much separated. It was killed thirteen months after the injury, when the divided portions of bone were found separated from each other fully three quarters of an inch, and the space was filled up only by a strong membrane.”

Presented by Joseph Swan, Esq.

The experiment is described by Mr. Swan in a paper, “On Injuries of the Pelvis;” in the *Medico-Chirurgical Transactions*, vol. xii., p. 523, London, 1823.

488. Portions of a right os pubis, which perished and were separated, after fracture through the middle of its body. They comprise nearly the whole extent of the bone, from the symphysis to the acetabulum.

The patient was a girl five years old. The fracture was produced by the fore wheel of a loaded narrow-wheeled waggon passing, as she lay on her back, between her legs and obliquely outwards over the right side of the pelvis. She recovered from the accident without any severe symptoms. Nearly four months afterwards one of the portions of bone was discharged through a small ulcerated opening in the groin; and the other portion passed through the same opening a few weeks later. The patient's recovery was complete three years after the accident; she did not become lame; but there was no appearance of reproduction of the bone.

Presented by G. Harrold, Esq.

489. The anterior half of a pelvis, with the bladder and adjacent parts. A fracture has extended through the right os pubis, about an inch from the symphysis, and another through the middle of the ramus of the ischium ; and the intervening part of the obturator ligament is irregularly torn. The sharp extremity of the fractured os pubis has penetrated the anterior wall of the bladder about half an inch above the orifice of the urethra.

The injury was produced by a heavy waggon passing over the pelvis of a lad twelve years old. He had passed neither urine nor fæces for sixty hours after the accident, when he was admitted into the Edinburgh Royal Infirmary in a state of collapse, and with a painful swelling of the abdomen. Very little urine was withdrawn by the catheter, and he died on the third day. A large quantity of urine was found effused in the cellular tissue of the pelvis.

The case is recorded in the London Medical Gazette, vol. vii., p. 29, October 2, 1830.

From the Museum of Robert Liston, Esq.

490. The anterior part of a pelvis, with the bladder, penis, and rectum. The arch of the ossa pubis (which is turned forwards and downwards) has been broken, a fracture extending through the body of the right os pubis, and through the descending ramus of the left. There is a rent, nearly two inches long, in the anterior part of the bladder, and the urethra is torn completely across at the junction of its membranous and prostatic portions.

The patient was a man twenty-four years old, over whose pelvis a heavy waggon had passed. Four hours after the injury, it being evident that urine was effused among the injured parts, an incision was made on the right side of the perineum, and bloody urine escaped. The patient, who before the operation appeared to be dying, soon after became better. He lived three days, the urine passing freely by the wound in the perineum.

After death it was found that, in addition to the fracture, by which the arch of the ossa pubis was separated, several other portions of both these bones and of the ischium were broken off. The right sacro-iliac symphysis was separated ; the right acetabulum was penetrated by the fracture, and matter was contained in it. Blood and urine had escaped to the lower part of the thigh, being especially effused about the sciatic nerve ; but no sloughing had taken place in any of the injured parts.

The case is further related by Mr. Swan, in his paper, "On Injuries of the Pelvis;" in the *Medico-Chirurgical Transactions*, vol. xii., p. 526, London, 1823.

Presented by Joseph Swan, Esq.

Fractures of the pelvis in other parts of the Museum :—
2915-6-7.

491. Three scapulæ from rabbits, in each of which the acromion process was broken across, and is united by bone firmly and with very little displacement of its portions. A perfect scapula is placed with them for comparison.

Presented by Joseph Swan, Esq.

492. The scapula of a dog, from which three portions were removed with a small trephine some months before death. All the apertures have been smoothly filled up with new bone.

From the Museum of Sir A. P. Cooper.

Fractures of the scapula in other parts of the Museum :—
2918 to 2921.

493. The clavicle of an old woman, which was fractured obliquely through the middle of its shaft. The scapular portion lies behind and below the clavicular one, but they are firmly united by an intermediate layer of bone: their ends are rounded off, and the medullary tube is closed at the end of each.

From the Museum of John Howship, Esq.

Fractures of the clavicle in other parts of the Museum :—
2922 to 2925.

494. Section of the upper part of a left humerus, fractured through the base of the head, just above the tuberosities; together with portions of the acromion and coracoid processes broken and detached from the scapula. The separated head of the humerus appears to have been so displaced that its articular surface is turned forwards, a part of its posterior margin alone remaining in connection with the glenoid cavity. The

shaft appears to have been forced upwards and backwards, and to have had its upper end partly driven into the cancellous tissue of the head. A considerable quantity of new bone is formed around the fractured portion of the humerus, especially upon the upper part of the shaft, which has thus been re-united with the head; but little union has taken place between the adjacent parts of the cancellous texture of the head and shaft. The fractured portion of the acromion is nearly in contact with the head of the humerus: both it and the coracoid process were united to the scapula by ligamentous tissue.

The patient was a robust gentleman, seventy-seven years old, and the injury was received in a fall from a cabriolet upon the left shoulder. Half an hour after the accident the power of the arm was found to be lost, the shoulder was enormously swollen, and its roundness diminished; a depression existed in the belly of the deltoid muscle; a hard tumour was felt under the clavicle on the edge of the glenoid cavity, close under the coracoid process. A crepitus was perceived, and the arm was an inch shorter than the sound one. The bones were replaced without much difficulty. As the tumefaction diminished there appeared a flatness on the upper part of the shoulder, and a large hard tumour, like the head of the humerus, was distinguishable in the situation of the coracoid process. Considerable motion of the arm was regained, but it could not be raised to a level with the shoulder, nor be brought forward across the chest. The patient died of apoplexy nine weeks after the accident.

The case is published by Sir A. P. Cooper, together with figures of the specimen, in a paper "On the Dislocation of the Os Humeri upon the Dorsum Scapulæ," &c., in the Guy's Hospital Reports, vol. iv., London, 1839, p. 279, pl. iv.

From the Museum of Sir A. P. Cooper.

495. Section of the upper part of a humerus, of which the shaft was fractured immediately below the tuberosities, in a plane extending transversely to the lower margin of the head. The fractured portions are united, chiefly by deposits of bone on their surfaces forming bridges around the fracture: the shaft is drawn a little upwards and inwards.

496. The other section of the same humerus.

From the Museum of Sir A. P. Cooper.

These specimens are figured with the paper just referred to, by Sir A. P. Cooper, pl. iii., p. 278.

497. A humerus which was fractured about two inches below its neck. The lower portion was drawn far upwards on the outer side of the upper one, and their adjacent surfaces are united by a large quantity of spongy osseous tissue. New bone has also been formed around both the fractured extremities.

From the Museum of Robert Liston, Esq.

Fractures of the humerus in other parts of the Museum :—

386, 398, 405-6, 427, 430, 432-7, 440-3, 2926 to 2946.

498. The bones and ligaments of an elbow-joint. Fracture through the base of the olecranon occurred long before death. The portions are not united, but their broken surfaces and edges are smooth, and covered in by a layer of compact tissue. There does not appear to have been any ligamentous tissue between them.

From the Museum of R. B. Walker, Esq.

499. The bones and other parts of an elbow-joint. The olecranon was transversely fractured. The portions are half an inch apart, and are connected by a band of dense fibrous tissue, attached to the posterior margin of the lower, and the anterior margin of the upper portion.

The joint had recovered perfect mobility.

From the Museum of John Howship, Esq.

500. A radius and ulna, with part of the humerus. The olecranon has been doubly fractured, and its portions are not united. The cartilage was completely removed from the articular surface of the ulna, and the corresponding surfaces of the humerus and radius; but on the summit of the head of the radius, and the tuberosity of the humerus, there was comparatively little change. At all the parts where the bone was exposed, its tissue is light and spongy.

The patient was a middle-aged man, who received a compound fracture of the olecranon in a fall. The injury was followed by acute inflammation of the joint, on account of which amputation was performed.

From the Museum of Robert Liston, Esq.

501. The bones of an elbow-joint. The olecranon was fractured a month before amputation was performed, and its portions are not united. The cartilage has been removed from the whole articular surface of the ulna; the subjacent bone is superficially ulcerated, and new bone is deposited upon the outer wall of the upper part of the shaft of the ulna. There is slight ulceration around the margin of the head of the radius, and upon a small part of the articular surface of the humerus. Just above the internal condyle a long thin layer of the wall of the humerus is in a state of necrosis, and was in process of separation by the ulceration of the surrounding part.

The patient was a middle-aged woman, who had received a compound fracture of the olecranon from a blow. Acute inflammation ensued, abscesses formed within and around the joint, and amputation was performed a month after the accident.

From the Museum of Robert Liston, Esq.

502. A radius and ulna, with part of the humerus. The radius and ulna were fractured transversely at the upper parts of their shafts. The portions of the radius, much displaced, are united by one process of bone extending between their extremities, and by another passing like a buttress nearly two inches long from the end of the upper, to the posterior part of the lower, portion. The fractured portions of the ulna are not united, but their extremities are enlarged by the formation of bone around them, and are smooth on the surfaces which moved upon each other. The point of the olecranon was broken off and united by ligament. The coronoid process of the ulna was also fractured, but is firmly united by bone, more of which is deposited on the articular surface. The heads of the radius and ulna, and the condyles of the humerus are enlarged and rendered irregular by deposits of new bone around them. Their articular surfaces also are rough, and a canal extends through the base of the olecranon to the outer surface of the bone, by which fluid was probably discharged from the joint. On the front of the external condyle is a hard polished surface, on which, after the removal of the articular cartilage, the head of the radius moved.

From the Museum of Robert Liston, Esq.

Fractures of the radius and ulna in other parts of the Museum :—
408-9, 422-6, 452-3, 2947 to 2954.

503. Section of a metacarpal bone, in which there had been a compound fracture. The portions are widely displaced, but are united by a soft substance. *Hunterian.*

504. The other section of the same metacarpal bone. *Hunterian.*

505. The upper part of a femur, with the acetabulum. The neck of the femur was vertically fractured close to its junction with the head, three weeks before death, but the broken portions are held together by the fibrous investment of the neck, the posterior and inferior part of which was not completely torn through. The ligamentum teres is very small.

From a woman seventy-six years old. The day after the injury, which was caused by a fall on the right trochanter, the limb appeared to be shortened an inch and a half, and the foot was everted. The case is described by Mr. Howship in a paper entitled "Cases of Fracture of the Neck of the Femur," in the *Medico-Chirurgical Transactions*, vol. xix., p. 1. London, 1835.

From the Museum of John Howship, Esq.

506. The upper part of a femur fractured through the junction of the head with the neck. The greater part of the neck is absorbed. The posterior part of its fibrous investment is entire, and the fractured surfaces are nearly in apposition, but there is no trace of a process of union.

From a woman about sixty years old. The fracture occurred six months before death.

Presented by Joseph Swan, Esq.

506 A. The upper part of a femur, the neck of which was fractured within the capsule shortly before death. The fibrous investment of the neck is torn on only the anterior part; its upper, lower, and posterior parts are entire, and hold the fragments close.

Presented by Edward Stanley, Esq.

507. The bones and other parts of a hip-joint. The neck of the femur was fractured in a vertical plane, probably a few days before death. The capsule is thickened, and its anterior portion, which has been turned forwards, is lined with lymph. The bones appear to have undergone no change.

Presented by Sir William Blizard.

508. The upper part of the right femur of a woman, seventy-four years old, of which the neck was fractured within the capsule of the hip-joint six years before death. The neck of the femur has been completely absorbed, and the upper margin of the head is three-quarters of an inch below the top of the great trochanter. The surfaces of the base of the head, and of the cancellous tissue between the trochanters, are hardened and adapted to each other: they were held together, with a limited capacity of motion, by the thickened and closely contracted capsule. New bone has been formed about the trochanters and in abundance upon the inter-trochanteric lines.

From the Museum of Sir A. P. Cooper.

- 508 A. The upper part of a femur, of which the neck was fractured vertically through its junction with the head, nearly six weeks before death. A large quantity of new bone has been formed upon the trochanters, but there is no union of the fracture. Numerous portions of bone lie loose in the bottle, which were formed in the soft tissues around the fracture, and separated in maceration.

The patient was a woman upwards of seventy years old. After the accident the motions of the limb were carefully restrained.

From the Museum of Robert Liston, Esq.

509. The upper part of a femur, with the acetabulum. There has been a fracture through the base of the head, and the whole of the neck has been absorbed. The fractured surfaces are smooth, and covered with ligamentous tissue and nodules of a substance having the appearance of cartilage, and with numerous loosely hanging shreds and slender pedunculated

growths attached to it. A part of the lower margin of the head of the femur is adherent to the adjacent portion of the capsule. The shaft was drawn upwards, so that the fractured surfaces were far from each other, and the base of the neck rested upon the dorsum of the ilium, above the margin of the acetabulum. The capsule is much thickened, and its whole internal surface is beset by growths like those already mentioned, but larger. The articular cartilage is uneven, as if partially absorbed.

From a man eighty-two years old. The fracture occurred in a fall, nearly three years before death. He was confined to his bed, with the limb extended, for twelve months. It was shortened four inches; but he was at last able to walk easily with a high-heeled shoe and a stick.

From the Museum of George Langstaff, Esq.

510. The upper part of a femur, with the acetabulum. The neck of the femur was fractured through its junction with the head, twenty-two months before death; and the portions are widely apart, the shaft being drawn upwards. The greater part of the neck has been absorbed: that which remains is surrounded with irregular growths of bone, and its fractured surface is covered with ligamentous tissue and prominent nodules of a substance like cartilage. The head is not altered in form, but part of its articular cartilage is absorbed: its fractured surface is smooth, and has some nodules of cartilaginous substance attached to it: its upper margin is attached by a broad band of ligament (the remains perhaps of its fibrous investment) to the remaining portion of the neck. The capsular ligament is thickened, and numerous lobulated processes of fibrous tissue project from it into the cavity of the joint.

The patient, a woman seventy-nine years old, fell on the right trochanter. On the same day the foot was found slightly everted; the limb was not then shortened, but it afterwards gradually became three inches shorter than the other. The case is related by Mr. Howship in the paper already referred to, p. 8.

From the Museum of John Howship, Esq.

511. The upper part of a femur, the neck of which was fractured very near the head, six years before death. The greater part of the neck has

been absorbed, but the fractured portions are closely apposed. There is an elevation of bone between the trochanters, apparently the remains of the neck, which has a nearly smooth, hard, and rounded surface, and which fitted in a concavity formed in the fractured surface of the head of the femur like a shallow ball-and-socket-joint. The lower and posterior margins of the fractured surface of the head are closely united by ligament to the adjacent portion of the capsule, and to the opposite fractured surface of the base of the neck; so that, at one part of the fracture a false joint has formed, and at another there is union by ligament. A large quantity of new bone has been formed upon the trochanters, and about the inter-trochanteric lines. The capsular ligament is thickened, and on its outer surface large and thick portions of new bone have been formed. The intimate union of the capsule with the lower and posterior margins of the fractured bone, and the general aspect of the parts, make it very probable that in this case, as in some of the specimens already described, the fibrous investment of the posterior and lower part of the neck of the femur were not torn across.

The patient was a man eighty-two years old. He was confined to his bed for eighteen months, at the end of which he could only walk with crutches. The utility of the limb, however, gradually increased, and long before his death he used to walk about without any assistance, and with but slight lameness.

From the Museum of George Langstaff, Esq.

512. The upper part of a femur, with part of the os innominatum. The neck of the femur was fractured near its junction with the shaft, but within the capsular ligament, fourteen years before death. The fractured surfaces are smooth, and each of them is covered with a tough fibrous tissue, mixed with nodules of a substance resembling cartilage, so that they may have moved freely upon each other. The neck of the femur is not absorbed: the greater part of the articular cartilage is removed; the head of the bone is reduced in size, and firmly fixed to the acetabulum and the adjacent part of the capsule. The capsular ligament is thickened, and there are many prominent fasciculi of fibrous tissue upon its interior. On the outer surface of its upper part is a bursa, which was interposed

between the summit of the great trochanter and the upper margin of the acetabulum.

The patient, a woman sixty-two years old, fell with her left hip upon stones. She was at once entirely helpless, but there seemed at first no shortening of the limb, and the injury was treated as a bruise. In three months she was able to walk without assistance. For fourteen years afterwards she followed an active and laborious occupation without discomfort: the left leg was two inches shorter than the right, but she never felt either pain or weakness. The motions at the hip were ample and free, and there was a slight eversion of the foot. The case is related by Mr. Howship, in the paper already referred to, p. 13.

[It will be observed that, in this case, a large portion of the neck of the femur, remaining connected with the head, is not absorbed; in other preparations also [Nos. 514-7-8, &c.], though in a less striking manner, the same fact is shown; so that it appears to be a general rule that that part of the neck of the femur, which, after intracapsular fracture, remains connected with the head, is not absorbed, as that part is which is connected with the shaft.]

From the Museum of John Howship, Esq.

513. A hip-joint, from a woman seventy-five years old, in whom the neck of the femur was fractured within the capsule ten years before death. The whole of the neck has been absorbed: the remaining surfaces of the base of the head, and the cancellous tissue between the trochanters (now set wide apart), are smooth, and covered with layers of ligamentous tissue, long narrow bands of which also pass from one to the other, and from both of them to the adjacent parts of the capsule.

From the Museum of Sir A. P. Cooper.

514. Section of the upper part of a femur, and of the acetabulum. There has been a fracture directly through the neck of the femur, near its junction with the head. All that portion of the neck which intervened between the plane of fracture and the shaft has been absorbed; and the head, unaltered in its form and structure, is attached to the shaft by an incomplete layer of ligamentous tissue.

Hunterian.

515. The other section of the same femur, showing, more distinctly than the

preceding specimen, a thickening and contraction of the capsular ligament. *Hunterian.*

516. The upper part of a femur, in which a fracture of the neck, within the capsule, occurred sixteen months before death. The fracture extended through the junction of the head and neck. The whole of the neck has been absorbed, and the fractured surfaces are smooth, and covered by ligamentous tissue. At the posterior and lower part, strong bands of ligament, about half an inch in length, extend from one fractured surface to the other, and from both, but especially from the base of the head, to the adjacent portion of the capsule. The capsule itself is shortened and thickened.

The patient was a woman fifty-five years old. The nature of the injury was not detected, and rest alone was employed. The limb was shortened an inch and a half.

From the Museum of George Langstaff, Esq.

517. Section of the upper part of a femur, the neck of which was fractured many years before death. The fracture extends in a vertical plane from the upper and outer margin of the head of the femur to the lower and outer part of the neck. That part of the neck which remained in connection with the trochanters has been absorbed; that part which was connected with the head is indurated, but not otherwise altered. The fractured surfaces have become hard and smooth, and are held near together by bands of tough ligamentous tissue interposed between them. A large quantity of new bone has been formed upon the intertrochanteric lines, and a part of it projects in a strong ridge, like a prop, beneath that portion of the neck of the femur which remains in connection with the head. The capsular ligament is shortened, thickened, and indurated. The articular cartilage has been partially absorbed.

From the Museum of George Langstaff, Esq.

518. The other section of the same femur.

The patient was a man sixty-five years old, who received the fracture in a fall from a gig. The symptoms of the injury were obscure. He was confined to his bed for nearly twelve months, at the end of which he was able to walk with crutches. His

limb was considerably shortened, but it became gradually more useful, and for some time before his death, which was caused by disease of the urinary organs, he used to walk with sticks.

The case, with others belonging to similar preparations from Mr. Langstaff's Museum, is further related in Mr. Langstaff's "Cases of Fractured Neck of the Thigh-Bone within the Capsular Ligament," in the Medico-Chirurgical Transactions, vol. xiii., p. 494, London, 1827; and in his "Catalogue of Preparations," pp. 33, &c., London, 1842. There is also an engraving of the specimen in Sir A. P. Cooper's "Observations on Fractures of the Neck of the Thigh-Bone," pl. xi., fig. 1. London, 1823. 4to.

From the Museum of George Langstaff, Esq.

519. Section of the upper part of a femur, which was fractured through the junction of the head with the neck, five months before death. The whole of the neck has been absorbed, and the head is united to the cancellous tissue between the two trochanters by a thin continuous layer of compact fibrous tissue. The structure of the head is unaltered, but there is scarcely a trace of the attachment of the ligamentum teres.

From the Museum of John Howship, Esq.

520. The acetabulum from the same patient as the preceding femur. The capsule of the joint is thickened, and nothing remains of the ligamentum teres but a few shreds attached to the bottom of the acetabulum.

The patient was a female sixty-six years old. She fell on the right hip. Directly after the fracture the limb was shortened two inches and a half, and the foot was everted. She was confined on a double inclined plane for a fortnight, but afterwards was not restrained. She died twenty-one weeks after the accident, gradually exhausted. The case is related by Mr. Howship in the paper already referred to, p. 15.

From the Museum of John Howship, Esq.

521. Transverse sections of the upper part of a left femur, the neck of which was fractured vertically close to the head, and entirely within the capsule. The periosteum around the fracture is slightly thickened. The head retains its natural level in relation to the trochanter. The broken posterior margin of the neck is driven for a short distance into the cancellous tissue of the head; and its anterior margin projects a little forwards;

but the parts have suffered no other displacement. The fracture has been so nearly repaired that the eye can barely discern its line, except in one situation, in which a very thin layer of tough ligamentous tissue intervenes between the broken surfaces. The two portions are immovably united by bone posteriorly; but in the anterior and upper part the union appears to be by ligament, and the portions are moveable to a very slight extent.

The history of the case is thus related by Mr. Swan in his "Essay on Tetanus, founded on Cases and Experiments," p. 15, 8vo., London, 1825.

"Mrs. Powel, æt. above eighty years, fell down in the afternoon of the 14th November, 1824. I saw her soon after, and found her complaining very much of pain in the left hip; the limb could be moved in every direction, but this motion produced excessive pain: she lay on her back, with the limb extended, and nothing was ever done except the application of fomentations for the first few days. I believed there was a fracture of the neck of the thigh bone, although the limb remained quite as long as the other, and I could neither perceive any crepitus nor any altered appearance in its position, except a slight inclination of the toes outwards. She had more constitutional irritation than I ever observed from a similar accident. She suffered much pain in the hip, and was in consequence obliged to take an opiate; but she got very little rest. She generally had much thirst; there was the utmost difficulty in keeping her bowels open, and she had great pain and difficulty in making water. She had no appetite for common food, and for about three weeks appeared so weak that she was under the necessity of taking wine and brandy. For some time all her urine and stools were passed in bed, but not involuntarily, and only because she could not be persuaded to use proper means; in consequence her back became rather sore. Latterly, she complained of pain in the abdomen, which was very tender on pressure, and made even the weight of the bed-clothes inconvenient. Her tongue became very dry and brown, and in the last twenty-four hours she was insensible. She died on the morning of the 19th of December, about five.

Examination.

This took place at seven in the evening.

There was some ecchymosis amongst the muscles about the injured part, and in the cellular membrane about the sciatic and anterior crural nerves. The greatest part of the fracture of the neck of the thigh bone, which was entirely within the capsular ligament, was firmly united. A section was made through the fractured part, and a faint white line was perceived in one portion of the union; but the rest appeared to be entirely bone.

The viscera of the chest were sound. The outside of the aorta was very vascular. All the intestines were very vascular, as if a state of excitement bordering on inflammation had existed in them.

There was violent inflammation of the semilunar ganglia.

The bladder was very large, and contained some urine. The uterus was very hard, and had a small ossific tumour in the fundus. The labia were excoriated, and there was nearly the same appearance on the buttock of one side."

Presented by Joseph Swan, Esq.

522. Sections of the upper part of a right femur, in which fracture through the neck is believed to have occurred eleven years before death, and to have been united by bone. The greater part of the neck is absorbed, and the head is half an inch below the level of the great trochanter. The walls of the head, neck, and shaft are continuous; but between the cancellous tissue of the head and that of the neck and shaft there is a vacant space, about a line broad, which was filled with a cartilaginous substance. One margin of this space is formed by a layer of compact osseous tissue, continued straight upwards from the wall of the shaft across the junction of the neck with the head, to the upper margin of the latter: the other margin of the space is formed by the unaltered cancellous tissue of the head. The walls of the shaft of the bone are thin.

The patient was a woman fifty years old. Immediately after a fall she had shortening of the right leg, and eversion of the foot. She was confined to her bed nearly twelve months, and for ten years afterwards walked with crutches. After death the right limb was two inches and a half shorter than the left.

The capsule of the hip-joint was found very much thickened, and the articular cartilages of the femur and acetabulum were partially absorbed. The bone was boiled for many hours, and all the cartilaginous matter was dissolved, which during life had filled the now vacant spaces. The case is described by Mr. Langstaff, in the paper already referred to, in the *Medico-Chirurgical Transactions*, vol. xiii., p. 499, London, 1835.

From the Museum of George Langstaff, Esq.

523. Transverse sections of the upper part of a left femur, in which are some appearances as if the anterior part of the base of the neck had been fractured, and the posterior wall had been bent forwards, or partly driven into the cancellous tissue between the trochanters. The anterior part of the neck forms a prominent angle, at which there is an appearance of a fissure, with new bone formed round it, and the supposed

line of fracture: the posterior wall is very short, and deeply incurved; but its compact tissue is perfect and continuous: the head is on a level with the trochanter, and its cartilage has been thinned, and in part removed.

From the Museum of Sir A. P. Cooper.

The three following preparations are placed here for the purpose of illustrating some of those appearances which have been regarded as produced by the repair of intracapsular fractures of the neck of the femur. There is no sufficient evidence that fracture had occurred in any of these cases: no line of fracture can be traced; there is no interruption of the continuity of either the cancellous or the compact tissue; and the appearances are not dissimilar from those observed in many cases, the results of injury without fracture, or of disease independent of injury. [See the specimens in the Series of Diseases of the Joints, Nos. 3332-5-6.]

524. Section of the upper part of a femur, which was supposed to have been fractured across the neck, and to have been united by an osseous medium. The neck is very short: the upper margin of the head is about a quarter of an inch below the level of the great trochanter, and there is a considerable deposit of new bone around the junction of the neck with the shaft. Both the walls and the cancellous tissue of the head are continuous with those of the neck and shaft.

525. The other section of the same femur.

Presented, with the preceding, by Robert Liston, Esq.

The preparation is described and figured in an "Account of a Case," &c. By Robert Liston, Esq., in the "Edinburgh Medical and Surgical Journal," vol. xvi., p. 214. Edinburgh, April, 1820.

526. Sections of the upper part of the left femur of a child, five years old, in which it was supposed that the neck had been fractured by a fall in infancy. The head is small, oval, and flattened on its articular surface, and its upper margin is a quarter of an inch below the level of the great trochanter. The neck is very short, but its walls and cancellous tissue are continued with those of the head and shaft.

Presented by Henry Earle, Esq.

527. Section of the upper part of a femur, in which there has been a comminuted fracture. The neck has been fractured obliquely through its junction with the shaft, just within the attachment of the capsule; another fracture has passed across the upper part of the shaft, just below the great trochanter: and another, apparently in a vertical direction, through the great trochanter. The neck has been thrust into the cancellous tissue between the trochanters. It has undergone no change of form or structure, and is firmly fixed at a right angle to the axis of the shaft, with a very thin layer of compact fibrous tissue intervening between its fractured surface and that of the cancellous tissue between the trochanters. On the exterior of the neck, opposite the line of fracture, there is a small accumulation of bone. The lower wall of the neck is supported by the lesser trochanter, on which it rests, a thin layer of fibrous tissue intervening between them. The fractures through the upper part of the shaft and the trochanters are completely united, and with but little displacement. A large quantity of bone, some of which forms pointed prominences, is deposited around the trochanter minor, and in a line following the direction of the fracture from that process to the base of the trochanter major.

528. The other section of the same femur. A portion of the capsule of the joint is here left, and is considerably thickened.

Presented, with the preceding, by Henry Earle, Esq.

529. Section of the upper part of a femur, in which a fracture extended obliquely through the base of the neck, in a plane between the trochanters. The neck is not altered in size or form: it has been forced downwards and outwards into the cancellous tissue between the trochanters, and has there become firmly united: a broad line of ligamentous tissue, with which some bone appears to be combined, marks, on the surface of the section, the bond of union. A large quantity of bone has been formed on the lesser trochanter, and forms a prominent ridge, on which the lower surface of the neck of the femur is supported.

From a man sixty-five years old. Twenty years before death he fell from the main-top of a ship to the deck. He remained eighteen months in an hospital, and upon his discharge was able to walk with a stick. The foot was inverted, and the limb shortened one inch.

From the Museum of George Langstaff, Esq.

530. Section of the upper part of a left femur, in which there has been a comminuted fracture between the trochanters, and in the upper part of the shaft. The fragments are firmly re-united, but with remarkable displacement. The shaft, which was obliquely fractured, has been drawn upwards, and the sharp point of its broken end projects nearly an inch above the upper margin of the head: it has also been rotated outwards, so that the linea aspera looks straight inwards. The head and neck, with the great trochanter entire, and with several fragments united to them, are all firmly united by bone to the posterior and inner wall of the shaft, in such a position, that that which was the vertical axis of the trochanter is directed straight forwards, while the axis of the shaft is at right angles with it; and the foot must have been turned straight outwards. New bone has been abundantly deposited about many of the lines of fracture.

From the Museum of Sir A. P. Cooper.

- 530 A. Section of a right femur, fractured very obliquely from before backwards, and from without inwards, through the whole length of the lower third of the shaft. The portions are united by tough partially ossified substance deposited between their adjacent surfaces, but with considerable shortening; the upper portion projecting with a sharp point in front and on the inner side of the lower one.

Presented by J. G. Andrews, Esq.

531. Part of a femur which was fractured obliquely near its condyles. The lower portion was pushed far upwards, and to the inner side of the upper one; but they are firmly united by thick irregular processes of osseous substance passing from one to the other.

Presented by Sir William Blizard.

532. The bones of a knee-joint. The epiphysis of the femur was separated by violence from the shaft, three years before amputation. The shaft was forced downwards and backwards. In this position a firm and smooth re-union has taken place, with very little shortening or distortion of the limb.

The patient was a girl fourteen years old, when her leg was caught in a wheel, and the epiphysis separated. After the accident the knee remained painful and swollen, and she halted a little in walking; but nothing particular ensued for nearly three years after her apparent recovery from the accident, when a large abscess formed in the ham, and communicated with the knee-joint. For this the limb was amputated, and the patient recovered.

From the Museum of Robert Liston, Esq.

533. A section of the lower part of a femur, and of the adjacent parts, after a compound fracture. A large portion of the wall and cancellous texture of the femur has been thrust through the tendon of the quadriceps femoris muscle, just above the patella. The knee-joint and the tissues around the protruded portion of bone appear to have been acutely inflamed: the cartilages are superficially ulcerated.

From the Museum of Sir A. P. Cooper.

534. The lower part of a femur, in which there is a fracture through the lower and posterior part of the inner condyle. The fracture is entirely within the knee-joint, and the portions are held together by the periosteum, a part only of which is torn.

Presented by Sir William Blizard.

Specimens of Fracture of the Femur in other parts of the Museum:—

Of the neck—

2955-6-7-9, 2960.

Of the shaft—

In its upper third, 401-2, 446, 454, 2959 to 2966.

„ middle third, 16, 389, 400, 403-A-B-C, 407, 439, 441-5,
2967 to 2978.

„ lower third, 412 to 416.

In animals, 387, 442, 447, 450-1, 2979, 2980-1.

535. A patella, with the adjacent parts, from the front of the knee-joint, having their blood-vessels injected. The patella has been fractured transversely. The portions are half an inch apart anteriorly, but posteriorly they are nearly in contact. The gap thus formed is partly filled by lymph, and a thin layer of the same substance is deposited within the joint over the line of fracture.

The patient, a woman sixty-seven years old, fell on her knee on a projecting stone. Repair seemed making progress, till, six weeks later, the patient died with apoplexy.

From the Museum of John Howship, Esq.

536. A transversely fractured patella, of which the two portions, more than an inch apart, are united by a broad band of ligamentous substance; "which" [union, says Mr. Hunter] "I suppose has been effected by granulations, without suppuration."*—*Hunterian MS. Catalogue.*

In the lower portion of the patella there is a transverse fissure, as if it had been a second time fractured shortly before death or amputation.

537. A patella, fractured transversely. Anteriorly the margins of the fracture are widely apart, but posteriorly they are nearly in contact, and the space between them is filled by a tough ligamentous tissue. The parts have been dried after the injection of their blood-vessels.

538. A patella fractured transversely, and similarly prepared. The two portions are more than an inch apart, and are connected by a band of dense fibrous tissue attached to their posterior margins. The fractured edges are rounded off, and the surfaces are smooth and widely separated: as in all the other specimens, the fragments are turned somewhat forwards, so that the anterior edges are further apart than the posterior.

* See the quotation preceding the description of No. 16, in Series III., vol. i., p. 12.

539. A patella from which the outer and lower margin has been obliquely broken off. The portions lie close together, but are not united.

*The three last preceding preparations are from the
Museum of Joshua Brookes, Esq.*

540. A patella, which was fractured transversely in two places. Of the three portions, the two upper are connected by a broad band of fibrous tissue two inches long; the two lower by a similar band, not more than a quarter of an inch in length. Some or all of the portions must have grown since the fracture, for, if now put together, they would form a patella much larger than any one of the natural size.

541. A patella fractured transversely in an irregular line through its middle. The lower portion is fractured vertically. The transverse fracture is united by fibrous tissue: the vertical one is partially united by bone.

542. The portions of a patella which was fractured transversely in an irregular line. They were connected by fibrous tissue, with an interval of about an inch between them. The lower portion appears to have been also fractured vertically, and to have had its two fragments completely united by bone: it is also considerably enlarged.

543. A transversely fractured patella, of which the portions are in close apposition, and in part united by bone. A small piece of the inner angle of the upper portion perished, and was in process of separation.

The patient, a sailor twenty-four years old, fell from a great height upon his knee. He was immediately confined to his bed, and the limb was kept in the extended position. Seven weeks afterwards he died with hectic fever, and extensive suppuration within and around the joint.

[The case is described in "Experiments and Observations concerning Fractures of the Patella, by George Gulliver," &c., in the *Edinburgh Medical and Surgical Journal*, vol. xlvii., p. 163. Edinburgh, January, 1837. The paper contains also an account of several experiments (the result of one of which is shown in the next following specimen) to prove that "Osseous union [of fractures of the patella] is simply the

effect of immoveable coaptation of the fragments, the provision for which, in certain forms of fracture, is the integrity of the aponeurosis in front of the bone."]

544. The patella of a dog, which was cut through transversely, without dividing the fibrous aponeurosis on its anterior surface. A complete union by bone has taken place, and the line of division is scarcely discernible.

545. The bones of a knee-joint, in which the tibia is completely and smoothly ankylosed by bone to both the femur and fibula. The patella is not united to either the femur or the tibia, but is much altered in form, and enlarged. Both its surfaces are marked by a deep irregularly sunken transverse line, as if it had been fractured and united by bone.

The disease of the joint had long existed. The patient recovered after amputation.

The six preceding specimens are from the Museum of Robert Liston, Esq.

Specimens of Fracture of the Patella in other parts of the Museum :—

2982 to 2985.

546. Parts of a tibia and fibula, fractured obliquely at the junction of the middle and lower thirds. The upper portions have been thrust downwards on the anterior and inner sides of the lower ones, and no union has taken place. The cancellous tissue of the fractured extremities is filled by lymph, and the periosteum, a part of which is reflected from the tibia, is thickened, and contains some lamellæ of osseous substance.

The patient, a man forty years old, received a simple fracture in a fall; the tibia subsequently protruded through the skin, and it became necessary to amputate the leg.

From the Museum of Robert Liston, Esq.

547. Part of the fibula of a man who had a compound fracture of both the bones of the leg. The upper portion is thrust downwards, so that its fractured extremity is nearly an inch below that of the lower portion. Its broken surface is almost smooth, the cancellous tissue being filled by a firm substance, and it rests in a cavity formed in the muscle into which it has penetrated, and lined by a smooth white membrane. *Hunterian.*

548. A tibia and fibula, fractured obliquely about an inch above the ankle-joint. Some blood is effused and coagulated between the broken surfaces. There is a small aperture in the skin, through which the upper portion of the tibia protrudes. The blood-vessels have been injected. *Hunterian.*
549. The other portion of the same tibia. *Hunterian.*
550. Part of a tibia, with the adjacent tissues, from a case of compound fracture. Portions of the bone have been removed, and the remaining fractured ends, an inch and a half apart, project into an extensive granulating cavity, and are nearly covered with lymph and granulations. *Hunterian.*
551. Portions of a tibia. The lowest portion, which appears to be the lower end of the shaft separated from its epiphysis, protruded in a case of fracture and was sawn off. The other portions, it is probable, were afterwards exfoliated. *From the Museum of Sir A. P. Cooper.*

Fractures of the Tibia and Fibula in other parts of the Museum :—

108, 408 to 411, 418 to 420, 429, 431-8, 444-8-9, 2986 to 3010.

Fractures of the Bones of the Foot, 3011-2.

Sub-Series 4.—*Inflammation of Bone.*

UNDER this title are arranged, in accordance with the plan of the Fourth Series in the Division of General Pathology, first, the specimens in which the chief result of the inflammation is the formation of new tissue; and, secondly, specimens in which the inflammation was attended by loss of substance.

The new tissue formed in the specimens comprised in the first of these sections is bone. In inflammation of the soft parts, the morbid product rarely acquires an organization so high as that of the tissue in or near which it is deposited; but the substance effused in inflammation of bone commonly attains the same structure and composition as the bone on or within which it is formed. As examples of this general fact, the first two specimens in the section (Nos. 552

and 553) exhibit the ossification of an inflammatory product, and of granulations from bone.

After these two specimens, the examples of inflammation, with production of new bone, are arranged in sub-sections, according to the situation of the disease. In the first sub-section are those in which the new bone is formed solely, or chiefly, on the external surface of bone; in the second, those in which it is formed chiefly in the compact tissue of bone; and in the third, are those in which its seat is in the cancellous tissue of bone.

Section A. INFLAMMATION OF BONE WITH FORMATION OF NEW BONE.

552. Section of the end of a femur, a fortnight after amputation. A small portion of the extremity of the wall suffered necrosis, and is separated from the rest by a narrow groove. Above it, a broad thick ring of incompletely ossified cartilage surrounds the shaft. A portion of this ring, with the periosteum over it, has been removed, to show that the subjacent surface of the bone is healthy. The end of the medullary tube is filled by a vascular substance, resembling cartilage partly ossified, and a flattened mass of granulations arising from this substance extends beyond and overlaps the cut end of the bone. The description in the 'Hunterian Catalogue' was as follows:—*f.* No. 7, "is a piece of the thigh-bone of a young lad who lived about a fortnight after the thigh was amputated. The fungus at the end of the bone is seen to come from the marrow. In the marrow near the end of the stump was bony matter forming, and all round the end of the stump was an increased bony thickness; and exfoliation is just begun."

553. The upper two thirds of a femur after amputation. As in the specimen last described, there has been necrosis of the end of the stump, a complete ring of which has perished; and new bone is formed around the end of the remaining part of the shaft. Within the ring of dead bone, and projecting beyond it, new bone has been formed, with a cancellous texture, and a smoothly rounded surface; a mass of granulations, like that

in the preceding specimen, having, it may be assumed, projected from the medullary tube, and been developed into bone.

From the Museum of Robert Liston, Esq.

Sub-Section a. *Inflammation of Bone with Superficial Formation of New Bone.*

THE first specimens (from 554 to 570) in this division are intended to show the usual characters of new bone formed, in consequence of inflammation, on the surface of a bone; and the successive changes through which such new bone passes, while the disease increases and then ceases to make progress. The selected specimens display the results of inflammation on the shafts of long bones, on which, indeed, the whole process of the formation of new bone may be best observed; but characters like most of those observed in these examples are found, only somewhat modified, in other cases.* In the examination of the specimens the following appearances will be found to mark certain chief stages of the morbid process:—

1. There is a thin layer of light, and friable, new bone, with a close, filamentous, velvety texture, and a smooth surface, gradually rising from the surrounding healthy bone.

2. Such a layer, increasing in thickness, becomes longitudinally grooved.

3. Fresh formations of new bone take place, which assume the form of nodules, and thick plates, laid over the longitudinal grooves, and leaving between them large holes and gaps for the transmission of blood-vessels. Such plates and nodules usually present a porous surface, and a finely cancellous, lung-like texture.

4. The disease ceasing to make progress, and new bone no longer accumulating, that which is already formed (in any of three shapes just described) becomes harder and heavier; the apertures which rendered its surface porous

* No attempt is made to arrange the specimens according as the seat of inflammation may have been in the periosteum, or in the superficial layers of bone, or in both at once. It may be possible to make such distinctions in favourable circumstances, but they cannot be certainly made in the present state of these preparations. Neither is the cause of the inflammation made a general ground of arrangement; for the specimens show a remarkable similarity in the characters of the new bone in many cases in which the causes of the inflammation were very different. (Compare Nos. 559 and 562, 569 and 570, 560 and 645, and others.)

diminish in size, as if closing in from their circumferences, till many of them are obliterated. Thus, the new bone, while still cancellous within, acquires a compact external layer: it also becomes more firmly united to the old bone on which it is situated.

5. The process of induration continuing, the new bone acquires throughout a hard compact texture; its outer surface becomes smooth, by the coalescing and levelling of the grooves and plates or nodules which it presented, and by the closing of nearly all the apertures by which it was perforated; and the old and new bone unite so closely that the boundary between them can be hardly, or not at all, discerned. The colour of the new bone, also, usually changes; at first it presents, when macerated and dried, some shade between light grey and brown, but, as it hardens, it becomes yellowish, or more like healthy bone.*

After these specimens of the ordinary characters of superficial deposits of new bone, others are arranged (from 571 to 580) in which the new bone presents different and peculiar forms, attributable either to the peculiarity of the disease in which it was developed, or to the character and relations of the bone on which it is formed, or the arrangement of the ligaments attached thereto.

These are followed by specimens (from 581 to 585) illustrating the peculiar manner in which new bone is commonly formed on the surface of a bone over which the integuments have been long ulcerated.

And, lastly, a few examples (586 to 592) are grouped together to display the peculiarities presented by new bone which has itself been the seat of various morbid processes, such as ulceration, necrosis, &c.

554. The upper part of the femur of a young person, in which necrosis followed fracture. The dead bone, comprising about an inch of the fractured end of the femur, is surrounded by a broad, shallow, ulcerated groove. A part of the shaft above this groove has a thin deposit of new bone upon its surface. The new bone, gradually rising on the surface of the healthy bone, is about half a line in thickness. It consists of

* Numerous examples of the changes just described, which are, in this part of the series, illustrated by typical specimens, will be found among the specimens of necrosis and other diseases attended by the formation of new bone. Especially, the preparations of necrosis experimentally produced by Mr. Hunter (641 to 653) afford, in the new bone formed for the repair of the injury, striking examples of all the successive changes above mentioned.

short and very fine osseous fibrils and lamellæ, which are rolled and curled, so as to enclose minute cellular and tubular spaces and channels. These are closely arranged, and form a dry, friable tissue, with a very finely grooved and perforated surface, and with an indistinct appearance of longitudinal *grain*, derived from the direction of the chief lamellæ. The new bone is closely connected to the surface of the subjacent old bone, but it may be scraped off; and the surface of the bone thus exposed (as shown at the sides of the specimen), appears only a little roughened by the enlargement of the vascular grooves on its surface.

Hunterian.

555. Section of the extremity of a tibia after amputation. There has been necrosis of the end of the bone. A part of the dead bone has been removed, and the rest was separated from the living bone by a broad, ulcerated groove. New bone has been formed over the adjacent living portion of the shaft. The new bone appears composed, like that in the preceding specimen, of fine osseous fibrils, and curled lamellæ, enclosing cells and tubules, and forming a dry friable texture. But part of its surface is marked by deep longitudinal grooves, similar to those in which the blood-vessels proceeding from the periosteum to the shafts of long bones lie, before they enter the Haversian canals. The size, direction, and general appearance of these grooves prove that the longitudinal blood-vessels of the bone were imbedded in them, and that the new bone was formed between the vessels and the shaft, and raised them up from it. The surface of the new bone between the grooves, and the borders of the grooves themselves, are perforated by minute, close-set apertures, many of which open into the tubular spaces enclosed by the lamellæ of the new bone, and appear to have given passage to blood-vessels proceeding to and from the periosteum. Parts of the surface of the shaft, exposed by the removal of the new bone, appear healthy, except that the vascular grooves are larger and deeper than in healthy bone.

Hunterian.

556. A thin section, either of some new bone like that in the last-described

specimen, or of the wall of a bone in which the vascular grooves are enlarged. The periosteum is thickened and indurated: some of its blood-vessels are shown passing into the grooves on the surface of the bone.

Hunterian.

557. The end of a femur, after amputation. A large portion of the shaft suffered necrosis, and separated. The dead bone is nearly six inches long; it includes at its lower extremity the whole thickness of the shaft; but, at its upper part, only the inner layers of the wall: it is nearly surrounded by new bone. The new bone is, as in the preceding specimens, light, dry, grey, brittle, and friable. The greater part of its surface, also, presents (like the preceding specimens) deep longitudinal grooves and numerous perforations, apparently for the passage of blood-vessels. But, in many parts the grooved texture is overlaid by deposits of new bone, in the form of nodules, and thick, roundly-bordered plates of various size and shape, which are attached to the ridges between the longitudinal grooves, and, in many places, leave only narrow gaps and foramina for the entry of blood-vessels. In their interior, these nodules and plates are composed, like the rest of the new bone, of delicate lamellæ, which form minute cells and channels, like those displayed in a section of an inflated human lung. Most of the plates and nodules have their surface covered with a thin layer of compact, yet finely perforated and porous, bone; but in some, the lung-like texture is exposed: and at the lower part of the specimen is a broad ring of bone, composed wholly of finely cellular and filamentous texture.

Presented by Sir William Blizard.

558. Portion of a tibia, in which necrosis, consequent on amputation, affected nearly five inches of the length, and, at the extremity, the whole thickness, of the shaft. The outer surface of the remaining portion of the shaft is covered by new bone, which is light, white, very delicate, and fragile. It is composed, like the plates and nodules in the last specimen, of fine osseous lamellæ, curled into crooked tubes and channels, all of which, having the same general oblique direction, give to portions of it a fibrous, asbestos-like appearance. Part of its surface

is nearly smooth, part is nodulated; everywhere, it is finely porous, and not covered in by a more compact layer. Between the nodules are large apertures and gaps for the transmission of blood-vessels.

Hunterian.

559. The lower half of the femur of a person whose skull and many other bones were extensively affected with syphilitic disease. The greater part of the shaft is covered by new bone, deposited in all the three forms illustrated in the preceding specimens. At the margins, the deposit is in a very thin, and, to the naked eye, uniform, smooth layer; so that, in some places, the bone looks as if it were only discoloured. The rest of the deposit is in a thicker layer, the thickness gradually increasing towards the centre. The surface of the greater portion of the deposit is, for the most part, deeply grooved, the grooves running longitudinally, or with a slight obliquity, and in some places coalescing. In many places, also, the margins of the grooves are thickened, and overlaid by flattened nodules and plates of bone, some of which are of large size. At the sides of the femur may be seen peculiar deposits of new bone, laid on the surface of that which is longitudinally grooved, and presenting traces of two or three broader and larger grooves which are directed *transversely* to the axis of the shaft. In these grooves lay the trunks of some of the transverse arborescent vessels of the periosteum, of which every artery has an associate vein on each side of it. The texture of the new bone in this specimen is in every part denser than in any of the preceding: it is intimately united with the old shaft; and its outer surface is very hard, and minutely perforated.

Hunterian.

560. The tibia from the same limb as the specimen last described. Its lower half is surrounded by similar deposits of new bone. Just above the internal malleolus is a small oval ulcer through the new bone, at the bottom of which a portion of the old shaft is in a state of necrosis.

Hunterian.

561. Section of the lower part of a femur, the wall of which is uniformly thick-

ened and indurated, probably in consequence of necrosis of a portion of its cancellous tissue. Some thin irregular plates of new bone (like those laid over the grooved new bone in the preceding specimens, but larger) have been formed outside the most thickened part of the shaft. They are attached to it by only a small portion of their margins and inner surfaces; in the rest of their extent they are free, separated by a distinct though narrow interval from the surface of the shaft; they must, therefore, have derived nearly the whole of their nutriment from the vessels of the periosteum. *Hunterian.*

The other section is preserved in No. 3170.

562. The left tibia of a lion, of which a great part of the surface is covered with new bone, deposited in the same forms, and with the same apparent structure, as in Nos. 559, 560. The only discernible difference is, that in this specimen there is more of the nodulated, and less of the longitudinally grooved, deposit than in them. *Hunterian.*

563. The right tibia of the same lion, similarly diseased. The osseous deposits, though very irregular, are arranged in precise symmetry with those on the left tibia. *Hunterian.*

564. A section of the right femur of the same lion, after being softened by acid. Nearly its whole surface is covered by a nodulated osseous deposit. The section of the new bone shows its finely cellular or lung-like texture, its more compact outer surface, and its close connection with the surface of the old bone, although the line of boundary between them is very evident. *Hunterian.*

“ From this preparation of one of the bones of the lion, which had been injected and steeped in acid, it appears that this newly added bone was vascular, and had only lost its earth by this steeping, its form still remaining; it therefore must be as much an animal substance as the old bone.”—*Hunter's Lectures on Surgery: Works*, vol. i., p. 507.

565. A right tibia, nearly the whole surface of which is covered with a thin irregular deposit of new bone. The deposit appears to have been, at a former period, like that shown in Nos. 559, 560, but the part of its surface which is not longitudinally grooved has become nearly smooth, as if by the coalescing and levelling of such plates of new bone as are shown in those specimens. The texture of the new bone is harder and more compact than in them; and the apertures for vessels penetrating its surface are in many situations more minute and less numerous. Some traces may be seen, on the posterior surface, of transverse grooves, in which the larger periosteal vessels lay. *Hunterian.*

The other tibia of the same person is similarly and almost symmetrically diseased. See No. 3033.

566. A similar specimen, in which the new bone, covering nearly the whole shaft of a tibia, appears to have made still further progress in the processes of induration, intimate union with the subjacent bone, and reduction in both the number and size of the vascular apertures in its surface. It may be observed in this, as in many other specimens of similarly diseased tibiæ, that the deposit on the inner aspect is chiefly of the longitudinally grooved form; while that on the posterior and outer aspects is more generally in plates and nodules. *Hunterian.*

567. Section of a tibia, and of part of the surrounding tissues. The inner surface of the shaft, through a length of about six inches, is covered by new bone, deposited in a layer which gradually increases in thickness from its margins to its central part, where it is rather more than half an inch thick. The greater part of the new bone appears harder and more compact than the original wall: they are intimately united; but a boundary-line between them may be discerned, marking the unaltered outline of the wall. The new bone is also distinguished from the old by having a vertical *grain*, as if from vessels running through it perpendicularly to the axis of the shaft. The periosteum covering the new bone is slightly thickened; and the integuments over it appear to have recently healed after ulceration.

Hunterian.

568. The other section of the same tibia, macerated and dried. It shows more plainly, that the disease, (which has all the appearance of an ossified venereal node), is almost confined to the anterior part of the tibia, only a small similar deposit existing on the posterior surface. The medullary tissue appears healthy. Except at the part beneath the ulcer of the integuments, the surface of the new bone is smooth, not porous, but marked by a few longitudinal grooves and large apertures for the transmission of vessels. In one situation its surface is bounded by a sharp projecting edge, is very irregular and spongy, or lung-like, and appears to have been penetrated by more blood-vessels than any other part.

Hunterian.

569. Section of a tibia, with a similar large ossified venereal node on its inner aspect. The boundary between the old and new bone cannot be clearly discerned. The new bone is very hard; its surface is smooth, except at one part, where a circumscribed roughness indicates that the integument over it may have been ulcerated: it is perforated by few apertures for vessels. The medullary canal of the tibia is not encroached upon; and its outer wall is of ordinary thickness.

From the Museum of Robert Liston, Esq.

570. Section of a tibia, on which, in consequence of a large wound, (the cicatrix of which is shown in the integuments), new bone has been abundantly deposited, in the same form as in the three preceding specimens, but over the whole, or the greater part, of the circumference of the shaft. A small part of the inner wall at the seat of the wound was removed. The outline of the original wall is but just discernible, the new bone formed on its exterior having completely coalesced with it. Opposite the wound the medullary cavity is also filled by new bone, which has coalesced with the inner surface of the wall. The periosteum, a portion of which is reflected, is thickened, and appears to have been firmly adherent to the new bone.

Hunterian.

571. An elbow-joint, in which the articular cartilages have been partially re-

moved, probably by chronic rheumatic disease of the joint. (See No. 945 and the specimens following it.) The surfaces of bone thus exposed are smooth, hard, and in some parts polished. Nodules of new bone, very compact and hard upon their surfaces, and partly covered by glistening fibrous tissue, form thick irregular borders around the articular margins of all the bones, and especially of the humerus. The head of the radius is much altered in form, and enlarged by the new bone around its margin. It is also turned backwards: and a large extent of its anterior part is flattened, and corresponds to a similar flattened surface on the front and lower part of the external condyle of the humerus, on which it must have moved a little in the bent position of the joint.

From a man fifty years old, whose opposite elbow-joint was also diseased. He died after amputation of one of his legs, with diseased lungs.

From the Museum of Robert Liston, Esq.

572. The upper part of a femur, on the head and neck of which (probably in consequence of chronic rheumatism) a great accumulation of new bone has taken place. The chief formation is about the attachment of the round ligament, and the base of the head, especially at its anterior part. In the former situation, there is a large prominent mass of an irregular conical shape, and coarsely nodulated, with a deep pit in its apex, in which the round ligament was attached. In the latter situation, the new bone forms a large nodulated cancellous mass, thinly covered with compact bone, measuring nearly an inch in depth, and an inch and a half in breadth, and projecting over all the articular part of the neck, though fixed only to the border of the head. The part of the head of the femur which intervenes between these masses of new bone, is hard, smooth, and polished. A vertical section of the head shows that this hardening extends for about a quarter of an inch into its interior, but that the rest of its substance is healthy.

Presented by Sir Everard Home.

573. A longitudinal section of the first two phalanges of a horse's foot united by bone formed between and around their corresponding articular extremities.

The new bone between their extremities forms a nearly continuous layer of cancellous tissue, like that of their shafts: the bone deposited around them is in large irregular masses, variously connected, which have a coarsely cancellous, lung-like texture, and some of which are covered by a compact layer, perforated by many apertures.

Hunterian.

574. The first phalanx of a horse's foot, on one side of which a broad and thick coral-like mass of heavy cancellous bone has been formed, and has grown behind the flexor tendons, till it nearly surrounded them. On the other side there is scarcely any growth of bone. The articular surfaces and other parts are healthy.

Presented by James Abernethy, Esq.

575. The right scapula and humerus of a small feline animal. The borders of their articular surfaces, and other parts adjacent to the joint, are covered by thick irregular masses of light and finely cancellous new bone. The masses attached to the scapula and the humerus had, in one situation, coalesced outside the joint, so as to destroy its mobility. The articular surfaces, and the rest of the bones, are healthy; but the head of the humerus has not its usual bearing upon the glenoid cavity.

The other shoulder-joint was similarly diseased.

Hunterian.

576. A patella, on the anterior surface of which new bone has been deposited, in the form of a broad thin plate, striated, as if composed of longitudinal fasciculi, some of which pass beyond its lower margin.

Hunterian.

577. The patella of some mammal, similarly, but more extensively, diseased. The new bone forms a thick mass, two inches long and half an inch wide, the ends of which are prolonged in numerous sharp, parallel spines.

Hunterian.

578. Two of the tarsal bones of a lion (probably of the same as No. 3060), on the surface of which new bone has been abundantly formed, in irregular plates, more than two inches long, and sharply pointed backwards in the direction of the axis of the tarsus. *Hunterian.*

579. One of the caudal vertebræ of the same lion, with similar laminated, but not pointed, deposits of new bone. *Hunterian.*

580. Four dorsal vertebræ, the bodies of which are united by a thin plate of bone extending over the middle and right sides of their anterior surfaces. The plate of bone has in some parts a fasciculated appearance, but its surface generally is smooth. Opposite the intervertebral spaces the new bone is accumulated in round masses, like exostoses. There is no distortion of the spine. *Hunterian.*

581. A vertical section of part of a tibia, on the anterior surface of which is a circumscribed, oval, thick deposit of new bone, with abruptly elevated margins. The limit between the original shaft and the new bone is clearly marked, and, the blood-vessels of the limb having been minutely injected, the new bone, which has chiefly a cancellous texture, is shown to be very vascular. At the upper part, a portion of the new bone has been removed by ulceration extending to the shaft.

From the Museum of R. B. Walker, Esq.

582. A portion of the integuments of the limb to which the tibia just described belonged. In the part corresponding with the new bone, there is a large and deep ulcer, with an uneven, indurated edge and base. At the part which lay over the ulceration of the new bone the integuments are completely destroyed.

From a girl twenty years old, who was admitted into the Lock Hospital with syphilis. The ulcer on the leg had existed four months: it was always exceedingly painful, and was spreading rapidly: the leg was therefore amputated.

From the Museum of R. B. Walker, Esq.

583. Part of a tibia, which, near the middle of its shaft, is enlarged, thickened,

and increased in density. On the inner aspect of the enlarged part is a sharply circumscribed oval elevation, with a flat porous surface, and an abrupt margin, over which it is probable that an ulcer of the integuments had long existed. *Hunterian.*

584. A tibia, the shaft of which is unnaturally flattened, both before and behind, the outer surface measuring at the broadest part only three-quarters of an inch. On the lower third of the shaft, over which there was, probably, a large ulcer of the integuments, is a broad, sharply circumscribed, and elevated, oval deposit of new bone, with a rough porous surface, and with borders projecting from half to three-quarters of an inch beyond the outer and inner margins of the tibia. In several other places thinner formations of new bone have taken place.

Presented by Sir William Blizard.

585. Parts of a tibia and fibula, both of which are enlarged, increased in density, and completely covered and united by plates of hard new bone. On the inner aspect of the tibia is an elevated flat surface, over which there was probably a large ulcer of the integuments. This elevation is upwards of five inches in length, and three in breadth; it presents an abrupt, somewhat over-hanging, margin, and a coarsely porous surface, like those shown in the preceding preparation.

Presented by Sir William Blizard.

586. Part of a tibia, of which numerous portions of the wall suffered necrosis. New bone has been formed on nearly every part of the shaft, partially enclosing the sequestra, the chief of which lie in cavities on the anterior part of the tibia. The greater part of the new bone has the ordinary form of flat nodules and plates, laid over a longitudinally grooved surface, imbricated, and in many parts united. But at the apertures, or cloacæ, through which the sequestra are seen, the new bone presents a peculiar structure. At some, it forms small compact plates, with irregularly crenated edges, the points of which radiate from the margins, and are directed towards the centres of the apertures, covering in the sequestra. But for some distance

round one large aperture, over which, probably, there was an inflamed ulcer of the integuments, the surface of the new bone is formed of minute curled and wrinkled osseous lamellæ, which being closely set, perpendicular to the axis of the shaft, and nodulated at their summits, give it a coarsely fibrous appearance. *Hunterian.*

587. The lower half of a tibia, of which a portion near the inferior extremity suffered necrosis and separated. The sequestrum is enclosed in a cavity formed chiefly by new bone, into which cavity there are several round apertures of various sizes, but none so large as the sequestrum itself. The new bone forming the walls of the cavity, and thickly covering all the adjacent part of the shaft, has in nearly every part a coarse lung-like texture, but is remarkably light and brittle, so that it crumbles under a slight pressure of the fingers.

Presented by Sir William Blizard.

588. A tibia, on which, after necrosis of many small portions of the shaft, an abundant formation of new bone covered all its surface, and nearly concealed the sequestra. The greater part of the new bone has the ordinary nodular and laminated form, but, near the spine of the tibia, is a deeper layer longitudinally grooved. Just above the ankle, on the anterior part, an oval portion of the new bone, together with a thin scale of the surface of the shaft, having suffered necrosis, was in process of separation; and (as is usual in such cases) there has been extensive ulceration of the new bone around the sequestrum.

Hunterian.

589. Part of a tibia, in which there has been necrosis of a narrow portion of the anterior wall about six inches long. The sequestrum is detached, but locked in by the new bone formed closely around it. The whole of the neighbouring part of the shaft is very much enlarged, misshapen, and increased in weight by new bone, which has been abundantly formed on its surface. The new bone on the posterior and outer aspects of the

tibia is very hard and heavy; its surface is nearly smooth, compact, yellowish-white, not porous, but perforated by many large, round, and oval apertures, and irregular gaps. In one situation its surface presents a broad, shallow, transverse groove, with a narrow bridge of bone over it, beneath which the large vessels of the periosteum lying in the groove must have run. On the anterior aspect are two apertures, through which the sequestrum is seen, and around these the character of the new bone is different. At some parts (below and on the inner side of the apertures) it consists of large irregular plates and nodules, separated by wide gaps, composed of a finely cancellous texture, and covered in by a denser but finely porous layer. Above this part, (just on the inner side of the larger cloaca, and above it), the surface of some new bone, which, like that covering the posterior and inner aspects of the tibia, had become smooth and very hard, has been overlaid by recent small patches of delicately cancellous osseous deposit. The margins and boundaries of the cloacæ are formed of delicate lamellæ, vertically set, and presenting, as in the last specimen, a coarsely fibrous appearance.

Presented by Sir William Blizard.

590. A tibia, on the lower part of which a large quantity of new bone had been formed, but was subsequently removed by ulceration or necrosis, leaving an oval space, nearly three inches long, at the base of which the surface of the original wall is exposed, slightly roughened by ulceration. Around the oval space, the remaining portion of the new bone forms an irregular elevated margin, and extends round the tibia, and as low as the internal malleolus. *Hunterian.*

591. A tibia, in which there has been necrosis of a portion of the anterior wall. The sequestrum is completely separated. It comprises a narrow strip of the deeper part of the wall, about five inches long, and an oval portion of the outer layers of the wall. The former portion, though loose, is nearly enclosed by new bone, which has been abundantly formed on all the surviving part of the shaft; the latter is exposed, and its anterior surface is thickly covered with new bone, which has perished with it. The new

bone on the sequestrum is longitudinally grooved: that encasing it is nodular and laminated. It is probable that, as in the preceding cases, there had been a circumscribed formation of new bone, which perished, together with a large portion of the deeper and previously healthy part of the shaft.

Presented by Sir William Blizard.

592. A large, thin, oval sequestrum of porous and finely cancellous new bone, spontaneously separated from the front of the tibia.

Presented by Sir William Blizard.

The principal specimens of superficial deposits of new bone, besides those already referred to, are Nos. 680 to 686, 738 to 751, 3013 to 3084.

Specimens of ulceration and necrosis of new bone are Nos. 701, 702, 703, 706, 708, &c.

Sub-Section b. Inflammation producing Expansion of the Walls of a Bone, and subsequent Induration by the formation of New Bone in the Expanded Substance.

THE following specimens (from 593 to 600) show, that among the results of inflammation of the compact substance of bone is enlargement, by swelling or expansion of its texture. A bone may be swollen, by acute inflammation, so rapidly as to indicate that its laminae and other component portions have been stretched by the enlarged blood-vessels and the interstitial deposit. But the inflammation of which the enlargement of a bone by expansion is the result is generally chronic; and the changes in the size of the bone, and in the arrangement of its parts, are effected by the slower process of an altered nutrition, the laminae and other portions growing as they separate and assume new positions.

The substance of the expanded bone may be irregularly cancellous, or porous; but the most striking effect of the disease, as shown especially in dry sections of long bones (its most frequent seat), is a separation of the concentric laminae of which their walls consist; so that the longitudinal section of the enlarged wall appears composed of two or more parallel or slightly diverging layers of compact tissue, with a widely cancellous texture between them; and these layers, at the boundaries of the diseased part, may sometimes be traced into continuity with those forming the healthy portion of the wall. The laminae may be sepa-

rated at a part, or through the whole circumference, of the wall; and, in either case, they may be separated into two, or into several, sets, and to any distance from each other, from a fraction of a line to half an inch, or perhaps more. Usually, the separated layers are carried outwards, and the bone appears outwardly enlarged; but, sometimes, the inner layers of the wall are pressed inwards, and encroach upon the medullary tissue.

The cancellous tissue between the separated layers usually appears, at first, to be formed of very light and delicate osseous fibrils and thin lamellæ, consisting, at least in part, of the branches of the Haversian canals, in which the blood-vessels pass between and through the component layers of the compact bone. In the first periods of the disease they enclose large spaces, which are usually filled with a bloody-coloured medulla; but this cancellous tissue, like the external formations of new bone, appears to have a tendency to become solid and hard; and its fibrils and lamellæ thicken, till they coalesce into a compact ivory-like substance, harder than healthy bone.

Any of the appearances, thus generally described, may be modified by the expansion taking place irregularly, so that the laminar arrangement is almost lost, and the surface of the bone appears uneven or tuberculated; or, they may be complicated by the coincident formation of new bone on the surface of the wall, or the thickening and induration of the original cancellous tissue. In its first stage, also, the disease is often coincident with atrophy; in which case, though the bone is enlarged, it is very light, and its texture presents the characters of defective, as well as of deranged, nutrition (as in Nos. 593-4-5). In such cases it is only by the presence of other results of an inflammatory process that the specimens can be distinguished (in the dry state) from those in which (as in Nos. 388, 389) the texture of the bone is expanded or rarified by atrophy alone; and it is often impossible to say of some specimens whether inflammation or atrophy were the chief cause of the change of structure.

593. Vertical sections of a tibia, in which a portion of the anterior wall, about four inches long, is increased to half an inch in thickness. The increase is consequent, chiefly, on a separation of the osseous laminæ of the wall, several of which may be distinctly traced at the upper and lower parts of the enlargement: in the middle they are confused, as if by the formation of new bone, and thickening of the cancellous tissue between them. The surface of the thickened portion is rough, porous, and covered with a thin layer of new bone. The posterior wall of the tibia is not

thickened, but some of its laminae are slightly separated, and the apertures for vessels on its surface are enlarged.

Presented by Sir William Blizard.

594. The corresponding ends of a femur and tibia, from a young child. The epiphyses, of which the ossification is incomplete, have separated, and are light and spongy; their cartilaginous parts have been removed in maceration. The lower part of the shaft of the femur is enlarged, in consequence, apparently, of the separation and expansion of the outer laminae of the whole circumference of the wall; a process which has been preceded or attended by extreme atrophy. On the posterior part of the femur the separated outer laminae form a layer of about three lines in thickness, the external surface of which is soft and porous, and presents numerous apertures, the result of atrophy. Within this is a layer of finely cancellous bone, composed of delicate osseous filaments, set, for the most part, vertically upon the outer surface of the inner laminae of the wall. On the anterior part of the shaft, the outer lamina has been more widely separated, and a much greater part of it has been removed by atrophy. The lower portion of it alone forms a continuous layer of soft compact bone; above, nothing remains, except thin filmy lamellae, attached to the ends of filaments, which form here, as on the posterior wall, a delicate network of cancellous texture, intermediate between the internal layers of the wall, and the remains of the separated external layer. The internal layers of the wall of the femur are thus enclosed within a quantity of delicate cancellous tissue, which, together with the separated and expanded outer layers investing it, forms a kind of second shaft around them: the tissue of the inner layers is soft, thin, and light. The upper end of the tibia is in a state similar to that already described. The separated and expanded outer layer is imperfect, but thicker than that on the femur; the cancellous tissue beneath it does not form so thick a layer; but the changes which the whole bone has undergone are essentially the same.

The patient was a boy two years and a half old. He had an abscess at the knee, which burst spontaneously, and exposed the portions of bone preserved. Numerous other abscesses formed, and the discharge from them proved fatal.

From the Museum of Robert Liston, Esq.

595. The lower end of a child's femur, in which it is probable that there had been disease of the epiphysis of the same kind as that in the lower part of the shaft of the femur last described. The shaft is here slightly enlarged, light, and atrophied; but its texture appears healthy. The epiphysis is enlarged to twice its natural dimensions, and, except by the intercondyloid fossa, its original form could hardly be discerned. Its articular cartilages have been removed, and the subjacent surfaces are ulcerated: its internal structure is light, expanded, finely and irregularly cancellous, and full of fatty matter. The sides of the condyles are covered by a very thin, flexible layer of light compact bone, perforated by many large apertures for vessels.

Presented by Sir William Blizard.

596. Section of a femur, of which the shaft is enlarged by thickening of its walls, but is scarcely increased in weight. The thickening depends partly on the external deposit of a thin layer of new bone, which is smooth and hard, and in some situations forms bridges over the large transverse vessels of the periosteum. But the chief increase of the wall appears to be the consequence of expansion of its outer layers, and, in some parts, of all its layers, into the form of a coarse cancellous texture, the chief plates of which have a longitudinal direction, and represent the layers of which the wall was originally composed. The lamellæ in this cancellous texture are thick and hard, contrasting strongly with the original medullary texture of the femur, which is peculiarly delicate and light.

Presented by Sir William Blizard.

The other section is preserved, No. 3085.

597. Section of a tibia, of which the whole shaft is enlarged and increased in weight. Its surface is, for the most part, smooth, hard, and marked by superficial transverse branching grooves. The enlargement appears to be chiefly consequent on the separation and expansion of the outer layers of the walls. The outlines of parts of the original outer and inner layers, which have retained their compactness, can be traced on the surface of the section. They are separated by a coarse cancellous texture, the principal

lamellæ of which have a longitudinal direction, and which, in many parts, has become, by thickening and coalition of its lamellæ, nearly as solid and as hard as ivory. A similar process of hardening and consolidation by thickening of the lamellæ, has taken place in the cancellous tissue of the medullary tube; so that the texture of the tibia is nearly uniform throughout. At the posterior and upper part of the shaft are two small oval apertures through its walls. They lead to a large chambered cavity in the interior, which probably contained pus; there are some similar cavities of smaller size in the lower part of the shaft, which do not open externally.

From the Museum of Robert Liston, Esq.

The other section is No. 3088.

598. Section of a femur, in which, after separation and expansion of the outer layers of the wall, similar to that shown in the preceding specimen, the thickening and consolidation of the cancellous tissue between the layers has continued till the walls are composed of a nearly uniform substance of ivory-like hardness, and from half to two-thirds of an inch in thickness. At the lower part of the vertical section, on the inner side, are traces of irregularly-formed new bone; and beneath this part the consolidation of the expanded wall is incomplete. The medullary tube is encroached upon by the thickened wall, but its texture is nearly healthy. In many situations are indications of thin superficial deposits of new bone, which have become hard, and are completely united to the rest of the indurated tissue.

Presented by Sir William Blizard.

- 598 A. Three transverse sections of the shaft of the same femur, displaying the same changes.

Another section is No. 3089.

599. Section of a femur, of which the shaft, in its lower two-thirds, was between eight and nine inches in circumference. The surface of the enlarged part is in some situations nearly smooth, but perforated by minute vascular apertures, and transversely grooved; in others, and especially in its

lower part, it is covered by irregular plates and processes of new bone. Just above the condyles are some syphilitic ulcers (others of larger size are shown on the other section, No. 3091). The upper third of the shaft, and the articular end, appear healthy. The surface of the section shows that though there has been more superficial formation of new bone than in the two preceding specimens, yet the enlargement is mainly due to the same changes as have taken place in them. In its upper half the texture of the enlarged part is uniformly heavy, ivory-like, and almost solid. Only traces remain of the cancellous tissue of the medullary tube, and of the inner layers of the original wall, which, now, by its expansion and consolidation and by the accumulation of new bone on its surface, is in some parts upwards of an inch in thickness. The lower half of the enlarged part presents similar changes in a less advanced stage. The wall is expanded, and portions of it are solidified and hardened: the lamellæ of part of the cancellous tissue in this part are thickened, and have nearly coalesced. In many parts of the hardened tissue, also, are small irregular cavities, such as may have contained pus.

Presented by Sir William Blizard.

600. Vertical section of a tibia, of which the anterior wall is increased to an inch in thickness, by expansion of its texture, and by the formation of new bone on its surface. The thickened wall is, throughout, as hard and compact as healthy bone; but along the middle of its cut surface a line may be traced, marking the boundary between that part of the thickening which is due to the formation of new bone on the surface, and that part which results from the expansion and subsequent consolidation of the original wall. The two parts have intimately coalesced, but the grain of the new bone may still be seen to be transverse, and that of the old wall longitudinal. The surface of the thickened wall is smooth and regularly arched.

Presented by Sir William Blizard.

Other specimens of similar changes are Nos. 3085 to 3094.

Sub-Section *c.* *Inflammation of Bone producing Consolidation of the Cancellous Tissue.*

THE effects of this process are rarely found, except, as in some of the preceding specimens, in connection with equal or greater changes in or upon the walls of a bone. In the following specimen, however, it appears to have taken place almost alone. The consolidation is produced by gradual thickening of the lamellæ and fibrils of the cancellous tissue, which thus encroach upon the spaces they enclose, and at length, obliterating them, unite in a solid mass, which is usually, also, harder than the healthy wall of a long bone.

601. Sections of a femur, of which the lower half is slightly enlarged, but with no other apparent change besides an increase of healthy cancellous tissue. The surface of the enlarged part is nearly smooth. The middle of the shaft appears externally quite healthy, except that it has a greater than ordinary curve anteriorly, from rickets; but internally, a portion of the cancellous tissue of irregular form, and nearly two inches in length, is consolidated into a mass of hard ivory-like bone, with a small cavity in its centre, and on one side so united with the wall that the boundary between them is indiscernible. About the borders of the consolidated part the lamellæ of the cancellous tissue (which in other parts of the medullary tube are very delicate) are thick and hard, and in a few small places are united so as to form nearly solid bone. The walls of the shaft surrounding the consolidated portion of the cancellous texture appear healthy, as is also all the upper part of the femur. *Hunterian.*

The other section is No. 3095.

SERIES XII.—Sub-Series 4.—Section B. INFLAMMATION WITH SUPPURATION
IN BONE.

602. A clavicle, in the outer half of which the walls are dilated, and in many places destroyed and perforated, so that their remains form a kind of irregular network of osseous tissue. The greater part of the cancellous

tissue has been removed, leaving a cavity intersected by a few portions of bone. All the remaining tissue is very light and porous.

These changes were probably consequent on scrofulous suppuration within the clavicle.

From the Museum of Robert Liston, Esq.

603. The upper part of a tibia, on the outer side of the head of which is a large and deep ulcerated cavity, with a wide open orifice, such as may have been connected with a circumscribed abscess. The adjacent osseous tissue is nearly healthy. The knee-joint communicates with a part of the cavity, and the articular surfaces are superficially ulcerated.

Hunterian.

Other probable specimens of abscess in bone are Nos. 597-9, 3096-7.

SERIES XII.—Sub-Series 4.—Section C. INFLAMMATION WITH ULCERATION OF BONE.

ULCERATION takes place in bone in consequence of many diseases, as in the discharge of abscesses, the separation of sequestra, &c. But in this division of the series, those specimens alone are included in which the ulceration appears to have been the chief morbid process, and has produced the most considerable and important changes. They are arranged to illustrate,—

1. Superficial ulceration of bone, such as occurs in common acute inflammation from injuries or other causes, and is attended by suppuration between the bone and periosteum. Nos. 604-5-6.

2. The ulceration of the articular parts of bones which is connected with common inflammatory diseases of joints, and which, in its usual course, extends from the articular surface into the deeper part of the bone, destroying them in some cases with a very uniform progress, in others irregularly. Nos. 607 to 617.

3. That form of ulceration which affects especially the bodies of spongy bones, such as the vertebræ, and the bones of the carpus and tarsus. It is probably often connected with tuberculous disease of the bones, is among the marks of the scrofulous diathesis, and is the form of ulceration to which, more peculiarly, the term Caries has been applied; its most striking character being its slow

destructive progress, with softening, rotting, and crumbling of the diseased bone, small portions of which, isolated by the ulceration spreading round them, are frequently discharged with a peculiar ichorous fluid. Nos. 618 to 625.

4. The ulceration produced by chronic rheumatism, or the so-called rheumatic gout, in the articular parts of bones, such as is usually attended by nodulated formations of new bone around the margin of the articular surface, and by *eburnation* or ivory-like hardening, and polishing of the parts of the diseased bone which are subject to friction. Nos. 626-7-7A.

5. The various forms of syphilitic ulceration. Nos. 628 to 637.

6. The ulceration attending the progress of lupus, and of various malignant diseases, extending to the bones from some adjacent tissue. Nos. 638 to 640.

604. The stump of a femur. Its sawn extremity suffered necrosis, and was in process of separation, a shallow broad groove having formed between it and the adjacent living bone. Above the groove, the anterior part of the shaft is superficially ulcerated: on its posterior part, thin layers of soft and porous new bone, longitudinally grooved, have been formed. The ulceration has made numerous sharp-edged pits and holes, of various size and shape, in the outer laminae of the shaft, as well as in some of the new bone thereon, and, penetrating through them to various depths, has formed rough uneven channels and small cavities in the compact substance beneath them.

Presented by Sir William Blizard.

605. The upper part of a skull, exhibiting superficial ulceration of both tables of the frontal bone, and of part of the left parietal bone. The disease was probably connected with acute suppuration between the bone and the pericranium and dura mater, the consequence of injury; for, on the left frontal prominence, there is a fissure through the part at which the ulceration has made most progress. The ulceration has, for the most part, proceeded uniformly through the superficial layers of both the tables of the skull, leaving only a few small irregular portions of them, which retain their healthy texture and smooth surface, and are elevated, like islands, on the surrounding rough, uneven, and, as if corroded, bone. On the left frontal prominence, the ulceration has formed several small apertures through the whole thickness of the skull. The bone, thus

ulcerated, and deprived of its supply of blood, by the detachment of its vessels with the pericranium and dura mater, died, and was in progress of separation. At its lower part, it is bounded by a deep ulcerated groove, which in many places has penetrated through the skull; and around its other borders, the adjacent bone appears to have been more than naturally vascular. *Hunterian.*

606. A large portion of a parietal bone which was exfoliated, after being ulcerated on both surfaces like the frontal bone last described. *Hunterian.*

Specimens of simple Ulceration of Bone in other parts of the Museum:—

Nos. 3098 to 3108, 3109?, parts of 633 and 3120, and many of the sequestra in No. 3153.

Simple ulceration of new bone is shown in Nos. 581, 588, 590: the ulceration of bone occurring in the separation of dead bone is illustrated in the next Sub-Series; the affection of bone commonly associated with chronic ulceration of the integuments, in Nos. 581 to 585.

607. A patella, of which (probably in consequence of disease beginning in the soft tissues of the knee-joint) the articular surface has been evenly removed by ulceration, exposing healthy cancellous tissue. *Hunterian.*

608. The upper part of a humerus, with the glenoid cavity of the scapula. The articular surfaces of both bones are, as in the last specimen, evenly ulcerated. A small quantity of new bone is deposited upon the rest of their surfaces, and their whole tissue is light and spongy.

From the Museum of John Howship, Esq.

609. The lower parts of a tibia and fibula, with the os calcis, astragalus, and os scaphoides. Their articular surfaces are all ulcerated, like those of the preceding specimens, but less evenly. Small portions of the compact layers forming their articular surfaces remain on the astragalus, and os scaphoides; and of these portions, some are perforated by numerous minute round holes, which appear to indicate the mode in which the superficial ulceration made progress, namely, by the formation of separate apertures through the compact articular surface, which coalesced as they gradually enlarged. In the cancellous tissue thus exposed, the ulceration has, for the most

part, extended evenly, but in some situations has penetrated deeply and irregularly: its progress does not appear to have been preceded by any change of texture, for all the tissue exposed by it is healthy. New bone has been abundantly formed on the parts adjacent to those which are ulcerated: and the texture of all that remains is light and spongy, but not greasy.

From the Museum of Robert Liston, Esq.

610. Part of a foot, in which there has been ulceration of the articular surfaces of the scaphoid and cuneiform bones. From the former, all the articular cartilage, and a part of the subjacent bone, have been removed; on the latter, small portions of the cartilage remain, but are loosely connected with the surface of the bone. The ligaments round this joint are thickened and irregularly ulcerated, and were surrounded by spongy granulations. On the upper surface of the cuboid bone is a shallow ulcerated cavity. The other articulations appear healthy, except in that their cartilages are thin.

The patient was a lad fifteen years old. The disease commenced, apparently in the scaphoid bone, after external injury.

From the Museum of Robert Liston, Esq.

611. A vertical section of the lower end of a tibia, from which the articular cartilage, and the greater part of the articular surface of the bone, have been removed by ulceration. The ulcerated part is covered with a thick layer of granulations, in which many vessels, derived from those of the bone, are injected. On the central part of the bone, which is not ulcerated, no similar granulations are formed.

Hunterian.

612. Two sections of an os calcis, in which ulceration has destroyed several portions of the wall, and of the superior articular surface, and penetrating to various depths in their substance, has so nearly isolated some small pieces that they appear as if they were being exfoliated after necrosis.

Hunterian.

613. A thin section of the same os calcis, injected, dried, and preserved in turpentine. Half of it looks as if it had suffered necrosis, for its cancel-

lous spaces are empty, while those of the immediately adjacent portions are full of medulla. But the blood-vessels of the apparently necrosed portion are injected. Its peculiar appearance, therefore, must be ascribed to the removal of the medulla, during the inflammation with which the ulceration, shown in the preceding specimens, was attended. *Hunterian.*

614. Section of an astragalus, probably from the same foot, similarly diseased. *Hunterian.*

615. The bones of a great toe, with the distal end of the metatarsal bone. The corresponding articular extremities of the metatarsal bone and first phalanx are deeply ulcerated, and the rest of their tissue is light and porous.

Amputated after long-standing disease with abscess.

From the Museum of Robert Liston, Esq.

616. The metacarpal and sesamoid bones, with the remains of the first phalanx, of a great toe. The corresponding portions of the metacarpal bone and first phalanx, and one sesamoid bone are irregularly ulcerated on their inferior and articular surfaces. The distal end of the first phalanx, and the second phalanx, were removed in a previous amputation, after severe injury; the remains of the shaft of the first phalanx are atrophied: in other respects the tissue adjacent to the ulceration, and exposed by it, is, as in the preceding specimen, healthy.

From the Museum of Robert Liston, Esq.

617. The bones of an elbow-joint, of which the corresponding articular ends have been irregularly, but, in parts, very deeply and extensively, ulcerated. Large holes have been made through the heads of both the humerus and the ulna, and, of the articular portion of the latter bone, hardly more than a thin shell remains. Portions, also, of the heads of the humerus and radius, including pieces of their articular surfaces, have been nearly detached by ulceration spreading round them. On the front of the inner part of the humerus, two small portions of the articular surface remain, and are hard, polished, and ivory-like. New bone has been formed on

the surfaces of the shafts near the joint: and the bone which is exposed by the ulceration does not exhibit an unhealthy texture.

Hunterian.

Specimens of Ulceration of Bone, connected with Diseases of Joints, in other parts of the Museum :—

Nos. 365, 500-1, 697-8-9, 700, 711-2, 742, 887 to 891, 896-9, 909 to 927; and others among the specimens of diseased joints, referred to in the next Series.

618. A hand, of which the blood-vessels have been injected. The corresponding articular surfaces of the second row of carpal bones, and of the metacarpal bones, are irregularly ulcerated, and numerous small portions of bone have been separated from them. There are traces, also, of extensive ulceration of the integuments over the metacarpal bones of the thumb and little finger, as well as ulcers of the shafts of those bones themselves. All the ulcerated parts appear very vascular. The radio-carpal articulation is healthy.

The disease had existed eight years. Its origin was supposed to be a sprain of the wrist. The patient recovered after amputation.

From the Museum of Robert Liston, Esq.

619. The bones of a great toe, with the metatarsal bone, amputated after long-continued deeply seated inflammation. The tissue of the metatarsal bone is expanded; its surface is, in great part, covered by finely porous new bone, perforated by large apertures for blood-vessels; and, near its distal extremity, it is irregularly and deeply ulcerated. The articular surfaces of this bone, and the phalanges, are healthy.

From the Museum of Robert Liston, Esq.

620. The bones of a foot. The os cuboides, and the proximal extremity of the fourth metatarsal bone, are deeply and irregularly ulcerated. Their remaining tissue, like that of all the other bones of the foot, is light, soft, and greasy. There are small deposits of new bone on those parts of the os calcis, astragalus, and os naviculare, which are adjacent to the os cuboides; but all their articular surfaces are sound. The whole foot is flattened. At the side of the preparation, are separated portions of the

os cuboides and the proximal end of the fifth metatarsal bone, both deeply ulcerated, which were removed by operation two years before the amputation of the leg. The proximal end of the remaining (distal) part of the metatarsal bone is smoothly rounded.

From a man twenty years old. Amputation was performed in consequence of the re-appearance of the disease after the removal of the portions of the cuboid and fifth metatarsal bones, and he recovered.

From the Museum of Robert Liston, Esq.

621. The bones of the anterior part of a foot, after amputation in front of the os calcis and astragalus. Nothing remains of the metatarsal bone of the great toe except its proximal extremity, which is deeply ulcerated. The internal cuneiform bone and its metatarsal articular surface are superficially ulcerated, as is also that part of the shaft of the second metatarsal bone which is adjacent to the remains of the first. The other bones are sound, but light and greasy.

The patient was a man twenty-five years old, of unhealthy constitution. Twelve years before the amputation of the foot, part of the diseased metatarsal bone, with the phalanges of the great toe, had been removed, but the disease recurred. After the amputation he recovered.

From the Museum of Robert Liston, Esq.

622. The bones of a tarsus and metatarsus. The navicular, cuboid, and cuneiform bones, and the proximal extremities of the first four metatarsal bones, are almost completely destroyed by ulceration. Nothing remains of them but some shapeless fragments of a light cancellous tissue, portions of which were loose, and detached. The cuboid bone has suffered less than the others. The tarsal articular surfaces of the os calcis, astragalus, and fifth metatarsal bone are ulcerated, and their texture is light and very greasy, as is also that of the shafts and distal extremities of the other metatarsal bones.

From the Museum of Robert Liston, Esq.

623. Part of the lower end of a femur, from one of the condyles of which the

whole of the articular cartilage has been separated in one piece. The surface of the cartilage next to the bone appears healthy, and has many spiculæ separated from the femur attached to it; its exposed surface is equally healthy, and its thickness is not diminished. The surface of the bone from which it was separated is soft and very irregular, as if ulcerated; its subjacent cancellous tissue is filled by lymph, mixed with pus or tuberculous matter. *Hunterian.*

624. The bones of a tarsus. In the os calcis is a deep ulcerated cavity, which opens very widely through its posterior and outer wall. Other portions of the wall are irregularly perforated, and of those which remain, some are superficially ulcerated, some are healthy, some have deposits of new bone in pointed processes upon them. The remaining portions of the cancellous tissue, and the other tarsal bones, are light and greasy. All the articular surfaces are healthy.

From a man twenty-six years old. A portion of the diseased bone had, before the amputation, been removed with the trephine, and the actual cautery had been repeatedly applied.

From the Museum of Robert Liston, Esq.

625. The metatarsal bone of a little toe, singularly altered in shape by ulceration and the formation of new bone. Its articular extremities are scarcely altered; but its shaft is flattened from above downwards, and nearly an inch in width. Its surface is porous, and in many parts deeply ulcerated.

From the Museum of Robert Liston, Esq.

Specimens of Carious Ulceration of Bone in other parts of the Museum:—

Nos. 713? 987 to 993, and many examples of Ulcerative disease of the Vertebrae in the Floor-Cabinets.

626. The left ulna of an old lion, who had lived long in England. The superior articular surface presents characters similar to those commonly found in human bones affected with chronic rheumatism or rheumatic gout. Its inner and middle parts, exposed by the loss of the articular cartilage, are hardened, grooved in the direction of the movements of the joint, polished, and ivory-like. But the greater part of the surface thus hardened is perforated by minute, round, close-set apertures, or larger irregularly shaped

holes, which penetrate the adjacent, and apparently thickened and indurated, cancellous tissue. Hard nodules of new bone form an uneven elevated border round nearly the whole of the articular surface.

Hunterian.

The other ulna, symmetrically diseased, and some other bones, are preserved in Nos. 3340-1-2.

627, 627 A. The lower part of a humerus, a radius, and an ulna, similarly but more diseased. The corresponding extremities of all these bones are much enlarged by the heaping up of irregular, coarsely nodulated masses of new bone, round the margins of their articular surfaces. These surfaces themselves, as well as those of parts of the new bone, are, in a few places, perforated by small *worm-eaten* apertures, and deeply ulcerated. The ulcers are of irregular size and shape; they have exposed portions of apparently healthy cancellous tissue, have spread more in depth than in extent, and have left portions of the articular surfaces unaltered between them. The parts of the articular surfaces which are not ulcerated are smooth and very hard, but have lost much of their natural form. Upon parts of the shaft of the humerus, and of the upper portions of the radius and ulna, thin plates of new bone, like those produced in common inflammation, have been formed. In its lower third, the shaft of the ulna is uniformly enlarged and increased in density. The inferior articular extremities of both radius and ulna are diseased in the same manner as the bones of the elbow-joint, but in a less degree.

Hunterian.

Specimens of similar Rheumatic Disease of Bone, in other parts of the Museum:—

Nos. 385, 524-5, 571-2, 944 to 949, 953-4, and others referred to after the descriptions of these specimens.

Syphilitic Ulcers of Bone.

NOTWITHSTANDING the absence of nearly all history of the cases, it is very probable that the following specimens, from No. 628 to No. 637, and from No. 3115 to No. 3141 in the Floor Cabinets, are examples of syphilitic diseases of bone. For some of them are inscribed as examples of "Venereal Disease;" in some, peculiar forms of ulceration of the skull and other bones are connected with that destruction of the palate, alveolar processes, nasal septum, or other parts, which

is almost characteristic of syphilis; and of all, it may be said that the forms of ulceration which they exhibit are different from those observed in any other disease of the bones. If the view of their all being of syphilitic origin be correct, it appears that, as in the skin, the effects of syphilis may present themselves in many forms—as the papular, pustular, scaly, and others—so, also, in the bones, they may appear in several distinct, though not always separate, forms of ulceration, or other morbid change. The following specimens exhibit three such varieties of the disease, which may be respectively named, after the characters assigned in the following descriptions, the *Reticulated* (628 to 631); the *Tuberculated* (632, 633); the *Annular* (634, 635); and the *Penetrating* (636, 637). The numerous specimens of these forms which the Museum contains, while they show the changes each may undergo in its progress, or in certain modifying circumstances, yet display sufficient uniformity of general characters to warrant their classification as so many forms of syphilitic disease of bone.

628. The left clavicle of the syphilitic patient from whom the specimens, Nos. 559, 560, were taken. It is enlarged by a smooth external deposit of porous, finely perforated, and, in parts, delicately reticulated new bone. Some small oval ulcers have penetrated into and through this new bone, and at their borders the bone appears indurated and thickened.

Hunterian.

629. A radius and ulna, exhibiting more extensive and advanced changes from syphilitic disease. The greater part of the shaft of each is enlarged and covered with new bone, with which its surface has coalesced. The aspect of the new bone is various: in some parts its surface is hard, nearly smooth, and perforated by only a few minute apertures; in some it is porous and friable; and in some, especially on the anterior aspect of the radius, its surface presents a peculiar reticulated appearance, as if, on a previously diseased surface, fresh bands and plates, or thick fibres, of hard new bone had been laid, interlacing in an irregular network. In the parts over which new bone has been formed are many ulcers, presenting chiefly the oval form, and varying from a line to more than an inch in diameter. The ulcers appear to have commenced in the new bone, and,

after penetrating through it, to have burrowed deeply into the substance of the shaft, forming irregular cavities and channels in its wall and cancellous tissue, and in some places perforating through its whole thickness. The walls of the ulcerated cavities are formed of bone which is harder, but more brittle, than the rest, and much of which is porous, and looks as if its lamellæ had been thickened, and the porous spaces between them filled by some morbid substance. *Hunterian.*

630. A tibia, on the anterior surface of which, near its lower end, is a large oval syphilitic ulcer. Nearly all the shaft is covered with new bone, like that in the last preparation. The ulcer, widely destroying the new bone, has in several places perforated through the subjacent wall of the radius, and has spread deeply in the medullary tissue. The surface of the cancellous tissue exposed by the ulceration is filled up as if by thickening and coalescing of its lamellæ; and the borders of some of the ulcerated apertures appear to be formed by hard bands of new bone, which, as in the preceding preparation, are arranged in a coarse network.

Hunterian.

631. The lower half of a tibia, a portion of the anterior surface of which has been thinly covered with new bone, and is irregularly and deeply ulcerated, like the three preceding specimens. At a short distance from the margins of the ulcer is a shallow groove, completely surrounding it, and indicating that the ulcerated bone was in process of separation, although its tissue does not present any marks of having suffered necrosis. The rest of the shaft of the tibia is thickened, compact, and heavy; and its surface is rendered uneven by superficial deposits of new bone.

Presented by Sir William Blizard.

632. A skull, in which syphilitic disease has affected nearly the whole of the frontal, parietal, and occipital bones, and has extended, in a slighter degree, over the squamous portion of the right temporal bone, the nasal bones, and the nasal process of the left superior maxillary bone. Where

the disease has made least progress, the surface of the outer table of the skull appears slightly elevated, and superficially tuberculated, with deep little foramina and narrow starred fissures intervening between the most elevated parts. In the further progress of the disease, these foramina, and the centres of the starred fissures, appear to have widened into small ulcers of various size and shape, the borders of which are depressed, and either thin and smooth, or pointed with little processes of bone radiating towards their centres. Such ulcers enlarging have spread in every direction, but more in width than in depth. Most of them present a round or oval form; but this form is often lost where two or more ulcers, enlarging near each other, have coalesced. The borders of the larger ulcers, formed by the external table of the skull, generally overhang the more widely ulcerated diploe, and either appear serrated, with wrinkled lines and narrow points of bone radiating towards their centres, or (which is more common) are thin, smooth, rounded, and shelving or turned in, as if they had healed even while the disease was making progress in the deeper or adjacent parts. The bases of these larger ulcers are very uneven; where they are formed by the exposed diploe its lamellæ appear thickened, indurated, and confused, and this is especially the case where the borders of an ulcer have the aspect of being healed. The ulcers, which have extended through the whole thickness of the skull, have penetrated the inner table by oval or irregular apertures, which are much smaller than those in the outer table of the skull, and many of which are situated at or near the margins of the ulcer, where its base is overhung by the outer table. The surface of the skull near the ulcers, and such small portions of it as remain between them, present signs of slightly increased vascularity. The general plan according to which the disease has made progress is nearly symmetrical.

It is said in the Catalogue of Mr. Brookes' Museum that, after death, there were no external indications of this disease, except a small sinus through the scalp, just above the forehead.

From the Museum of Joshua Brookes, Esq.

633. A skull, of which a large portion has been destroyed by tuberculated syphi-

litic disease, like that shown in the preceding specimen. Three-fourths of each parietal bone, including nearly the whole of the sagittal and lambdoidal sutures, are removed, and there are numerous large apertures in the portions that remain, as well as in the frontal bone. The external surface of the frontal and parietal bones, where the disease has made least progress, are tuberculated, cracked, and *starred*; in a somewhat more advanced state, there are superficial ulcers of irregular form, with tuberculated bases, and smooth shelving margins; and in a later stage, similar ulcers have penetrated the skull by one or more apertures. In these characters the specimen resembles that last described. But it shows, besides, that, in many places, the same kind of ulceration commenced in the inner table of the skull, and made exactly similar progress towards perforation from within outwards, as, over a greater extent and in different places, it has made in the opposite direction. Where, also, the outer surface of the inner table has been exposed by ulceration from without, it has in many places acquired a wrinkled and tuberculated appearance, like that with which this disease usually commences in the outer table.

The surfaces of the upper part of the occipital bone are ulcerated in a different manner. Both of them, probably in consequence of acute inflammation occurring in the course of the syphilitic disease, are exceedingly rough and irregular, with sharp-edged, interlacing and confused, shallow pits and channels, like those produced by the diffuse superficial ulceration which occurs in acute inflammation of the surface of a bone, as in Nos. 605-6. In many situations the bone thus ulcerated is completely penetrated, but by small apertures. The ulceration and destruction of the parietal bones is almost exactly symmetrical; that of the frontal and occipital bones is less so.

Presented by William Norris, Esq.

634. A skull, in which nearly all the surface of the frontal and parietal bones is superficially tuberculated. The skull appears to have been uniformly more vascular than the preceding specimens, and most of the numerous ulcers formed in and around the tuberculated parts have characters different from what are there shown. These ulcers are all less than half

an inch in diameter ; they are, for the most part, isolated, circular or oval, with sharp, abrupt, and jagged margins : they penetrate to various depths, and in some instances pass straight through both the tables. In the greater part of them it is evident that the form of the ulcer was at first annular, destroying a narrow ring of bone, and leaving a small central portion healthy, or only superficially ulcerated : in some, near the superciliary ridge and the lambdoidal suture, a central portion has been thus nearly isolated by the ulcer around it penetrating through both the tables. The diploe is not more extensively destroyed than the compact substance is ; and there is no appearance of healing. The trephine has been applied in three places in front of the coronal suture. The alveolar border of the upper jaw has been absorbed, probably after the teeth were lost in salivation. The sutures are nearly all obliterated.

Presented by Sir William Blizard.

635. A skull, in which are numerous annular syphilitic ulcers of the frontal and parietal bones. Like those in the preceding specimen, they are, for the most part, oval or circular in form, and from one to six lines in diameter. Their margins and bases are irregular ; many present the annular form ; and they vary much in depth. In several places two or more of them have coalesced, so that the primary form is lost ; a few only have perforated the skull. They are not symmetrically arranged. The bone intervening between them, and the inner table of the skull, appear to have been more than naturally vascular, but in other respects are healthy : there is none of the tuberculated character of the surface of the bone which is shown in the preceding specimens of syphilitic disease of the skull. The greater part of the septum of the nose, the left inferior turbinated bone, and large portions of the palatine plates of the superior maxillary and palate bones have been destroyed by ulceration. The alveolar processes of both jaws are also nearly destroyed. Of the teeth, two molars of the lower jaw alone remain, and the greater parts of the sockets of these have been removed.

Hunterian.

636. The upper part of a skull, both surfaces of which are nearly covered by

minute circular and oval ulcers, from half a line to a line in diameter, and for the most part superficial. The ulcers are least numerous on those parts of the parietal bones over which the temporal muscles lay; on nearly all the rest of the outer surface of the frontal and parietal bones they are so closely crowded together that they appear to form a continuous superficially ulcerated surface, surrounded by enlarged apertures and grooves for blood-vessels. Whether thus crowded, or more thinly scattered, their arrangement is almost exactly symmetrical. On the inner table of the same bones there are many, but less numerous, minute ulcers; and the surface of the inner table is rendered uneven by the formation of new bone, and the enlargement of its vascular grooves. Here also the disease is arranged on each side with an almost precise symmetry. Besides these ulcers, there are some others presenting very different characters, but probably formed by the coalescing and further progress of the preceding. By these the left parietal bone is completely perforated in five places, and the right in one; and on each of the bones, as well as on the frontal, there are also some deep ulcers, which appear to have been in progress towards perforation, some from within outwards, others in the opposite direction. The cavities and apertures thus formed present a circular or oval shape, and vary in diameter from two to seven lines; their margins are abrupt and formed of the exposed diploe, of which in some cases the ulceration has destroyed more than it has of either table. New bone has been deposited on the inner table around nearly all these larger ulcers, and on the outer table some forms an elevated sinuous border around the largest of all the apertures. Except in that the grooves for vessels are enlarged, the surfaces of the tables intervening between the ulcers are healthy.

The specimen is marked "Sept. 3, 1779. Died about 5 weeks ago, aged 19. G. Brande." And in Mr. Hunter's hand-writing, "supposed to be venereal."

Hunterian.

637. The upper part of a skull, in which are several large oval ulcers, very like those by which the perforations were made in the specimen last described. At the borders of each of these large ulcers, there are on both tables numer-

ous isolated, small, circular and oval, ulcers, from half a line, or less, to a line in diameter, which penetrate either through the skull or, more or less deeply, into the diploe. These are arranged in nearly circular or oval groups, surrounded on the inner table by rings of new bone, and on the outer table by converging branched grooves, and in some instances by very thin annular formations of new bone. The larger ulcers appear to have been formed by the coalescing of many of the small ones. The formation of the smaller ulcers seems, as in the preceding specimen, to have commenced almost simultaneously in corresponding parts of both tables; but in their progress they have sometimes destroyed one more widely than the other. In most instances, the diploe is destroyed to a greater extent than either of the tables. The surfaces of the tables intervening between the ulcers or the rings of new bone around them are smooth and healthy.

Presented by H. L. Thomas, Esq.

Specimens of Syphilitic Ulcers of Bones in other parts of the Museum :—

Reticulated, 3110 to 3114.

Tuberculated, 3091, 3115 to 3122, 3125-6?, 3128, 3131-2.

Annular, 3124, 3133-4-5.

Penetrating, 3136-7.

Many other specimens of Syphilitic Ulceration are placed with those of Necrosis, as in 704-5, 3129, 3130-1, 3133, 3137.

Syphilitic Necrosis appears to occur very rarely in previously healthy bone; but it may supervene in bones presenting any of the forms of ulceration just described.

638. A skull, in which nearly the whole of the bones of the left orbit, and of the left side of the nose, and large portions of the frontal and sphenoidal bones, have been destroyed by ulceration, consequent, probably, on the spreading of some malignant disease. The margins of the ulceration are irregular, sharp, and shelving; but the texture of the exposed and adjacent bone appears healthy.

Presented by Sir William Blizard.

639. A tibia and fibula, with part of the bones of the tarsus. Just above the ankle-joint a portion of the fibula, upwards of two inches long, and including its whole thickness except a narrow band at the posterior part, has been removed by ulceration. The borders of the ulcer are irregular, but

very abrupt and sharp; the fibula above it is considerably enlarged, thickened with deposits of new bone upon its surface, and, both below and above the ulcer, firmly ankylosed to the tibia. The tibia is healthy, except that a small quantity of new bone has been formed on it near the seat of the ulcer of the fibula. The os calcis also has similar deposits, and is partially ankylosed to the astragalus.

From a man aged fifty. A pony kicked him on the seat of disease, ulceration followed, and ultimately assumed a cancerous appearance. The leg was amputated, but he died with diseased lungs a few weeks afterwards.

From the Museum of Robert Liston, Esq.

640. The greater parts of a tibia and a fibula. On the anterior aspect of the tibia is an ulcer six inches long, and two inches wide. It is of an oval form; its margins are irregular, abrupt, and sharp; its base is very uneven, for in some parts it has extended through nearly the whole thickness of the shaft, in others it has destroyed only the inner wall. The remaining osseous tissue is in parts thickened, but in others appears healthy. The adjacent part of the tibia is enlarged, and a small quantity of new bone is formed on its surface. The fibula also presents similar formations on its surface.

The patient was a man forty-two years old. The soft parts over the ulcer in the tibia had been for many years the seat of a fungous malignant-looking ulcer, and his general health was much impaired. The limb was amputated below the knee, and the head of the fibula was removed. Violent inflammation of the knee-joint took place, and was followed by profuse suppuration, and hectic, with which the patient died.

From the Museum of Robert Liston, Esq.

Other specimens of destruction of bone by malignant disease are from No. 806 to 858.

SERIES XII.—Sub-Series 5.—DEATH OF BONE; NECROSIS.

THE specimens of necrosis are arranged to illustrate,—1st, In general, the nature of the processes which follow the death of bone, and the variations to which they are subject, through local or constitutional peculiarities: and, 2ndly, In particular, the same processes in each of the bones or chief portions of the skeleton.

The division commences with a series of preparations (from No. 641 to No. 653), which are described in the Hunterian MS. Catalogue as specimens of "exfoliation in consequence of death, produced by the actual cautery applied at different periods. All of them show that round the dead bone, an additional bony matter was laid on the sound [bone]; or rather, that the soft parts round the dead bone became bony, and as the fungus [of granulations] was forming from these soft parts so as to close over the dead bone, so did this fungus form into a bone so as to enclose the dead part."

These preparations, which are followed by two exhibiting similar appearances in injured wood, are admirably adapted for the illustration of the general nature of the processes by which a portion of dead bone is separated, and its loss repaired; and they, also, exhibit a complete history of superficial necrosis, or the form of necrosis in which the dead portion includes at least as much of the outer surface of the bone as of its deeper substance. It appears to have been chiefly from them that Mr. Hunter drew the account of necrosis, which, collected from his Lectures [*Works*, Vol. I. p. 525], is here subjoined.

"Exfoliation," he says, "is the separation of a dead bone from the living." "When a piece of bone becomes absolutely dead, it is then to the animal machine as any other extraneous body, and adheres only by the attraction of cohesion to the machine. The first business of the machine, therefore, is to get rid of this cohesion, and discharge it. For effecting this separation there are several natural and successive operations going on."

"The first effect of the stimulus [produced by the dead bone] is on the surface of the living bone, which becomes inflamed; whether new vessels are formed, or the old ones become larger, is undetermined; but by injecting the surface of the part, it appears evidently much more vascular than the other parts. The surrounding parts also inflame, as the periosteum and cellular membrane, and often taken on ossific inflammation. This produces another process: first, absorption of the earthy matter, and all the surface between the living and dead parts of the bone becomes as soft as if steeped in acid, while the dead part remains as hard as ever. To complete the separation, the absorbents continue their office, and absorb the living parts also, and the first process is in a small degree attended with the second." . . . "The first appearance of separation is an alteration in the part round the exfoliating piece. This alteration is first a sponginess; next, its becoming fuller of little holes; then a small groove is produced, a kind of worm-eaten canal about the thickness of a shilling, becoming gradually deeper and deeper; and the depth is irregular, according to the extent of the original cause." . . . But "the operation of separation does not take place equally; it begins at the circumference, and continues on to the centre; and before the centre has begun the absorption of the earth, the circumference has begun" the absorption of the animal substance of the bone.

Mr. Hunter further explains that while the separation between the dead bone and the living is going on, granulations are being formed from all the surrounding tissues that were inflamed, such as the periosteum, and cellular tissue; and that it often happens that, after some time, as these granulations grow from every side over the dead bone, and are ossified, the sequestrum is "locked in at the edges," and appears like an internal exfoliation, being enclosed in a nearly complete cavity of bone. "When the dead part is wholly loose, it is, like all extraneous bodies, pushed up to the surface." . . . "For from all that living bone adjacent to the dead piece, granulations arise, which push up the dead piece against the upper sides of the cavity [of bone in which it has been inclosed]; and in consequence of this pressure against the newly formed bone [of which the upper or outer side of the cavity is composed] the absorbents are set to work to remove it, and in proportion as this is absorbed, the dead piece is pushed out, the granulations filling the space behind it:" lastly, these granulations ossify and restore the size and strength of the original bone.

Mr. Hunter believed that, in the ordinary process of exfoliation, the separation was effected by the absorption of the surface of the living bone, and in evidence adduced this example. "If a circular piece is taken out of the skull, and the circular edge of the remaining bone has its life destroyed by the actual cautery, to any distance, this deadened part will separate and come away, which it might not be able to do without a loss of substance between the living and dead bone. Another proof of the loss of substance in the supposed case is, that the [outer] side of the circular piece which is separated will retain its spiculæ, while the edges of the remaining bone, so far from corresponding with them, are quite smooth. Now, as there is room in this circular hole to allow the ring of bone to come out, its regularity [that is, the regularity of the edges of the hole] cannot be the effect of new matter added between the spiculæ, but is in consequence of the absorption of those spiculæ."

Mr. Hunter added, "But I by no means wish to be understood that no absorption of the dead piece can take place; for, on the contrary, I believe that Nature sometimes finds it necessary to the completion of her process; it generally takes place when the separation is slow, and the granulating process is quick." The only instance, however, which he adduces of the absorption of dead bone is that of the removal of the fangs of teeth which are about to be shed; and there is no proof that he believed more than that, in cases of necrosis, while the dead and living bone are still continuous, a part of the former may be absorbed before it is separated. In speaking of enclosed or encased exfoliations he does not mention the possibility of the size of the dead portion being diminished by absorption.

The preceding explanation of the usual consequences of necrosis is illustrated by the series of experimental preparations already mentioned, and by others immediately following them, (from No. 656 to 678,) which are arranged according to the stages of the process thus described.

But, some of the processes which are here illustrated, (especially those for the

formation of new bone,) are modified according to the seat of the necrosis. These modifications are shown in the specimens arranged next after those which illustrate the process described by Mr. Hunter. The specimens from No. 679 to No. 686 display the progress of those cases of necrosis in which certain portions of the superficial layers of the wall of a bone do not perish together with the deeper layers beneath them, but separate with the periosteum, remain attached to its inner surface, and constitute so many centres of ossification for the formation of the new bone. Nos. 687 and 688 are specimens of necrosis affecting only the middle or inner layers of the wall of a bone: the specimens from No. 689 to No. 695 are of necrosis of the cancellous tissue alone, or chiefly; and those from No. 696 to No. 700 exhibit necrosis of the articular portions of bones.

In all these cases, the necrosis has its seat in bone of apparently healthy texture. But the characters of sequestra, and parts of the processes of separation and repair, are sometimes peculiarly altered by disease preceding the death of the bone. The specimens in this Series, from No. 588 to No. 592, show necrosis in new bone; and those from No. 701 to No. 705 display it in bone which was ulcerated, or otherwise diseased, before it perished.

The specimens following, Nos. 706 to 709, are examples of what may be termed *double necrosis*, in which, after one portion of bone has died and been partially separated, another adjacent or surrounding portion has also died, and been in process of separation with the previous, and now included, sequestrum.

At the end of the division [from No. 710 to No. 715] are placed some specimens of necrosis consequent on peculiar local or general diseases: such as, obstruction of an artery, phlegmonous erysipelas, scrofula, syphilis, and the effects of mercury.

SERIES XII.—Sub-Series 5.—Section A. NECROSIS IN GENERAL.

The thirteen following preparations are Hunterian.

641. Section of the metacarpal bone of an ass, from which a portion of the wall, including more of its surface than of its deeper substance, was in process of exfoliation after being cauterized. The separation of the living from the dead portion is indicated by a narrow groove extending from the surface to some depth between them, and, deeper than this groove, by a thin layer of soft substance, by which the dead and living bone are

held close together. New bone is formed on the margins of the living bone, beneath its periosteum. The wound through the soft tissues over the cauterized portion of bone is widely open, and its margins are formed of healthy granulations.

642. The other section of the same metacarpal bone, macerated and dried. The dead portion of bone has completely separated in the maceration. The new bone forms a layer which extends, gradually decreasing in thickness, over the surface of the shaft, for a considerable distance around the seat of exfoliation.
643. Section of the metacarpal bone of an ass, on which a similar injury was inflicted, a longer time before the death of the animal. The separation of the dead bone is complete. The ring of new bone formed around the sequestrum, extends half an inch over its margins, enclosing it in a cavity which has a central aperture filled with granulations from the surrounding soft parts.
644. A similar preparation, obtained at a yet later period after the injury. The central space or aperture remaining in the new bone formed around the sequestrum, and converging over it, is smaller than that in the preceding specimen. A layer of soft granulations has arisen from the surface of the living bone beneath the sequestrum. The periosteum is reflected from an adjacent part of the shaft, exposing the outer margin of the circle of new bone.
645. The metacarpal bone of an ass, exhibiting similar changes, after having been macerated and dried. The sequestrum is completely separated, and lies loose in the cavity formed by the new bone, the borders of which have grown far over it on every side. The new bone is light and porous, and extends over the surface of the shaft far beyond the seat of the exfoliation.
646. A similar specimen, partially macerated. The new bone extends so far

over the sequestrum that only a small aperture remains in its centre. By this aperture, the cavity in which the sequestrum is enclosed communicates with a fistulous canal through the granulations from the soft parts. The new bone is much harder and more compact than in the preceding specimens; and its union with the shaft is more intimate.

647. A preparation similar to No. 643. The sequestrum has been removed, to display the vascularity of the walls of the cavity in which it was situated.

648. The other section of the preceding metatarsal bone, macerated and dried.

649. A preparation similar to No. 647, in which is also shown a section of the vascular wall of the fistulous passage by which the cavity containing the sequestrum opens externally. The sequestrum lies in the bottle; its length is upwards of two inches, while the aperture into the cavity which contained it is not more than an inch in its greatest diameter.

650. The other section of the preceding metatarsal bone, macerated and dried. The new bone has a compact texture, and has entirely coalesced with the original shaft.

651. Section of the metacarpal or metatarsal bone of an ass, from which the exfoliation of a very thin piece of the surface of the wall has been completed. The cavity in which the sequestrum lay has been filled up with very hard and compact new bone, which has intimately coalesced with the remainder of the shaft, though, by the difference of its structure, the line whence the sequestrum was separated is still discernible. A process of the new bone has grown into the fistulous canal through which the cavity containing the sequestrum communicated externally. The wound through the integuments is nearly cicatrized.

652. The other section of the same bone, macerated and dried.

653. A similar specimen. The quantity of new bone formed is less, and the

external wound has cicatrized. A well formed periosteum is continued over the new bone from the adjacent part of the shaft.

654. Longitudinal section of a small branch of a tree, in which, after an injury intentionally inflicted, changes very similar to those consequent on superficial necrosis of bone have been produced. A portion of the whole thickness of the bark, of an oval form, was removed; and the superficial layers of the subjacent wood, having in consequence died, are separated by a distinct dark line from the adjoining living wood. Part of the new wood which was formed in the subsequent growth of the branch projects over the margins of the dead wood, so as to lock it in, in a manner similar to that in which the sequestrum is partially enclosed in some of the preceding specimens.

655. Longitudinal section of a small branch of a tree, from which a ring of bark was removed, and in which changes similar to those shown in the preceding specimen, but more advanced, have taken place. On one side of the section, the dead wood has completely separated; on the other, its partial separation from the living wood is indicated by a dark line. New wood has been formed at both margins of the ring, but a greater quantity projects over the upper than over the lower margin. No union has taken place between this new wood and the surface of the dead wood over which it projects; but the bark has grown to the extremity of the new wood, and, at one part, is continued over its extremity to its inner surface.

Specimens of superficial Necrosis in other parts of the Museum:—

Nos. 662 to 672, 701-2-3, 708, 711-2, 723, 726, 748, 767, 3137, 3142-3, 3153, 3160-1, 3173-5-6, 3192 to 3198, 3201, 3205.

Further Illustrations of the general Consequences of Necrosis.

a. Separation of the Periosteum from the Dead Bone, in Necrosis involving the outer surface of a Bone.

656. "A section of a femur, which was amputated, with the periosteum sepa-

rated; to show how clear the periosteum separates from the bone in inflammation; a fact almost always observable after amputation."—*Hunterian MS. Catalogue.*

The change which has taken place here is, probably, the separation of the periosteum after necrosis of the extremity of the bone divided in amputation. The separation extends nearly two inches upwards.

657. Part of the hind leg of a large dog. Necrosis of the whole thickness of the lower three-fourths of the tibia was produced by filling the medullary tube with lint. The periosteum is separated from the surface of the dead bone, and is very vascular. No reparative process appears to have commenced.

From the Museum of Robert Liston, Esq.

b. Formation of New Bone on the Boundary of the Living Part.

658. Section of the end of a femur after amputation. The end of the bone is not covered by periosteum, and (although its texture appears unchanged) it had, probably, perished. Above the uncovered part, the periosteum and some of the adjacent tissues are thickened, and a thin layer of new bone is in one situation deposited beneath the periosteum at the boundary of the part which is presumed to have perished.

Hunterian.

659. A similar preparation. No groove has, in either of these specimens, been formed between the dead and living parts of the bone. *Hunterian.*

660. Portions of a femur, with necrosis, which occurred after a compound fracture about six inches below the summit of the great trochanter. The necrosis has affected the extremities of both portions of the bone, but that of the lower portion to a much greater extent than that of the upper. The periosteum is separated from the extremity of the lower portion,

and loosely connected with the rest of it, except at the boundary between the dead and living parts. In this situation it is thickened and firmly adherent to some new bone formed between it and the surface of the shaft.

The patient was a boy sixteen years old. The fracture was the result of a fall from a considerable height, and was not well managed. A large abscess formed in the thigh, and after death the end of the lower portion of the femur was found drawn up to the sacro-sciatic notch.

From the Museum of Robert Liston, Esq.

661. Section of a tibia, of which a considerable portion of the wall, and some of the adjacent cancellous tissue, suffered necrosis. The line of boundary between the dead and living portions is marked only by increased vascularity along the borders of the latter; no groove is formed. Above and below the dead portion large quantities of very vascular new bone have been formed between the periosteum and the surface of the shaft, and are connected by a narrow strip of new bone, which is in close contact with the dead portion of the shaft. The periosteum, a part of which is reflected from the surface of the new bone, is thickened, and more than usually vascular. There are several deposits of a firm pale substance, like lymph, in those parts of the cancellous tissue which have not perished.

From a young person, in whom the disease had existed between three and four weeks.

From the Museum of Robert Liston, Esq.

c. Formation of the Groove between the Dead and Living parts of the Bone.

662. Portion of a skull, in which a large piece of the frontal bone perished in consequence of a blow. The texture of the dead bone is not changed, but, at the margins of the living bone, the apertures for blood-vessels are larger and more numerous than is natural, and an irregular but very shallow groove is formed. *Hunterian.*

663. The upper part of a frontal bone, of which a considerable portion of the outer surface was in process of exfoliation. The dead portion has the mark of a blow on it, and is distinguished by its pale colour, and clean polished surface; it is encircled by a broad shallow groove, and the surrounding bone is unnaturally porous, from the enlargement of its vascular canals. *Hunterian.*

664. Part of a frontal bone, a small portion of the outer surface of which was in process of exfoliation. The dead bone is not altered in appearance, but is surrounded by a broad shallow groove, and by large apertures for vessels in the adjacent living bone. The skull is fissured just below the dead portion.

The patient died some weeks after receiving a blow on the head. Soon after the injury a part of the scalp was reflected, for the purpose of trepanning, but no fracture being discovered, the trepan was not applied. The exposed portion of the skull perished, and while its exfoliation was proceeding the patient died.

Hunterian.

In these specimens of necrosis of the skull the formation of the separating groove has not been preceded by the growth of new bone. The indisposition to the formation of new bone on their outer surface is a remarkable peculiarity of the bones of the skull: between their inner surface and the dura mater it is often formed.

665. Section of the end of a femur, after amputation. Its extremity perished, and was charred by the actual cautery, which was applied to accelerate its removal. It is separated by a broad and deep groove from the adjacent part of the shaft, around which a thick ring of new bone is formed. The cancellous tissue is healthy, and its surface is covered by a thin slough. *Hunterian.*

666. The other section of the same part, macerated and dried. *Hunterian.*

667. Part of a similar ring of dead bone, completely exfoliated from a femur after amputation. It shows, as the preceding specimens also do, the

irregularly jagged edges described by Mr. Hunter as existing in the portions of dead bone separated after trephining. [See page 122.]

Hunterian.

668. A transverse section of a tibia, from which a portion of the wall was in process of exfoliation. A narrow groove, filled by soft vascular tissue, separates the dead from the living bone; the texture of the former is unchanged; that of the latter is expanded and swollen. *Hunterian.*

669. Part of an astragalus, from which the superior articular surface, having perished, was in process of exfoliation. A very narrow ulcerated line separates the greater part of the dead from the living bone; and the cancellous tissue beneath the line is more vascular than that in any other part. *Hunterian.*

670. A vertical section of the same astragalus, which, after having its blood-vessels injected, has been dried and suspended in turpentine. The boundary between the dead and living portions appears wider than in the preceding specimen, in consequence of the shrivelling of the lymph or granulations by which it was filled. *Hunterian.*

671. A similar section of the same astragalus. *Hunterian.*

672. Another section of the same astragalus, macerated and dried. It shows, more clearly than the preceding sections, how far the separation between the dead and living portions of bone had proceeded. *Hunterian.*

[It may be observed that these four specimens are very like those in Nos. 612-3-4, in which the vascularity and injection of the vessels of similar portions of an os calcis and astragalus, which were being separated by ulceration, prove that they had not perished. The portions nearly detached in these specimens are not injected; it is, therefore, nearly certain that they had perished.]

673. A section of the lower end of a fibula, from which a portion of the malleolus was in process of exfoliation. The dead and living portions of bone

are separated by a deep groove on their outer surface. The exterior of the fibula above the exfoliation is superficially ulcerated, very vascular, and covered with new bone. *Hunterian.*

674. The other section of the same fibula, macerated and dried.

Hunterian.

675. A portion of bone, with its investing soft parts, "to show the appearance of an ulcer over a bone which is exfoliating."—*Hunterian MS. Catalogue.*

d. Advanced, or nearly completed, Formation of New Bone.

676. Section of the tibia of a large dog, in which necrosis of a portion of the anterior wall, and of the adjacent cancellous tissue, was artificially produced a long time before death. The dead bone, which includes the whole thickness of the wall, and is distinguished by its dull white colour, is enclosed in a cavity lined by very vascular granulations. The anterior wall of this cavity (in which are one or more external openings) is formed by new bone, apparently produced, as in Mr. Hunter's experiments, from the walls of the shaft above and below the dead bone. The texture of the new bone is vascular and spongy; externally, it is covered by an imperfect periosteum, continuous with that of the original shaft; and, internally, is lined by granulations which are in close contact with the sequestrum. The other boundaries of the cavity are formed by the surfaces of the bone whence the sequestrum separated, all of which are lined by granulations. A large quantity of new bone is formed on every living part of the exterior of the shaft, and, especially, opposite the sequestrum, where it forms a layer in some situations nearly half an inch thick. Its tissue is vascular, and rather compact; it is closely united with the exterior of the shaft, and is covered by the original periosteum thickened and more than usually vascular.

From the Museum of Robert Liston, Esq.

e. Changes produced in the portion of Dead Bone.

677. "A great toe, the first bone of which had become dead. A soft covering for the end of the metatarsal bone has taken place to preserve the joint, as also on the end of the last or second bone, by which means the dead bone is perfectly enclosed. It has got out of the direct line between the two bones, in its way to the skin; but it is half eat away by the surrounding granulations."—*Hunterian MS. Catalogue.*

678. Portion of a humerus, about seven inches in length, which separated after necrosis. It includes the greater part of the inner layers of the wall, but none of the cancellous tissue. Its outer surface is everywhere rough and irregular, except in the upper part, where it is smooth, as if formed by the outer layer of the original wall. At this part, a portion of the sequestrum having protruded during life, was removed with cutting forceps. The remainder continued enclosed, for a long time, in the soft and granulating tissues around it; but the cut surface has undergone no change, and an incision made by the end of the blade of the forceps, where it did not cut completely through the bone, still looks as if it had been made recently. *From the Museum of Robert Liston, Esq.*

f. Separation of portions of Living Bone with the Periosteum, and Formation of New Bone on them as Nuclei, in cases of Necrosis affecting portions of the superficial, and portions of the deeper, layers of a Bone.

679. Part of a tibia, from a case of compound fracture. The periosteum is thickened, and, with parts of the superficial layers of the bone adhering to its inner surface, is separated for several inches above the fractured extremity. At its broken end, the whole thickness of the shaft has suffered necrosis; above this part, its surface presents shallow excava-

tions, which exactly correspond to the portions of bone separated with the periosteum. *Hunterian.*

680. Section of the radius of a dog, in which extensive necrosis of the walls was produced by the introduction of a foreign body into the medullary tube. The dead bone comprises, in nearly two-thirds of the length of the shaft, the whole thickness of its posterior wall, and the greater part of the thickness of its anterior wall; the cancellous tissue of this part was destroyed in the experiment. On the posterior part of the bone (on the left hand side of the preparation), new bone has been formed on the surface of those portions of the shaft which survived, above and below the sequestrum. On the rest of this part no new bone has been formed; but the periosteum, which separated from the surface of the shaft, is very vascular, and lined with florid granulations. On the anterior part of the bone, where, as already stated, the sequestrum does not comprise the whole thickness of the wall, a complete wall of new bone, nearly a quarter of an inch thick, has been formed, by the growth (it may be assumed) of that portion of the outer layers of the original shaft which survived and separated with the periosteum. This new wall is connected above and below with the old one; its tissue is spongy and vascular; it is lined by florid granulations, which are in close contact with the dead bone; and, externally, is covered by the original periosteum, thickened, and more than usually vascular.

From the Museum of Robert Liston, Esq.

681. Sections of the tibia of a dog, into the medullary tube of which, after the removal of a considerable portion of the periosteum, a red-hot wire was introduced several weeks before death. Part of the shaft has perished in its whole thickness: but at the extremities of the bone both the wall and the cancellous tissue have retained their vitality. A new bony case has been formed around the greater part of the dead bone. The exterior of this case is firm and compact, its interior is spongy and vascular, and lined by a soft and very vascular membrane. At the parts from which the periosteum was removed no new bone has been produced. The

original periosteum is continued over the new bone from the uninjured extremities of the shaft.

From the Museum of George Langstaff, Esq.

682. Section of the tibia of a dog, in which necrosis was produced by thrusting a foreign body into the medullary tube. The sequestrum measures about three inches in its greatest length; it appears to comprise in some parts the whole thickness of the wall, but all the visible part of its outer surface is rough. New bone has been produced, forming a new wall, which is complete, except at the part where the original wall was perforated for the introduction of the foreign body. The cancellous tissue of the original shaft, which was not destroyed by the experiment, is firmer and more dense than usual; while the compact tissue is thickened and spongy, and covered with new bone.

From the Museum of Robert Liston, Esq.

683. Section of the tibia of a dog, in which necrosis of a portion of the cancellous tissue, and of the anterior wall, was produced by the introduction of a foreign body into the medullary tube. The sequestrum, suspended by the side of the tibia, is between two and three inches long, half an inch wide, and consists of a portion of the wall, including parts of its outer layers. The cavity which contained the dead bone is lined with a thick layer of firm and vascular granulations, and is complete, except at the part where the wall of the original bone was perforated, and where there is a small aperture. The anterior wall of this cavity, in which is the aperture just mentioned, is formed by a layer of new bone, half an inch thick, continuous with the sound shaft above and below. The posterior wall is formed by the remains of the original shaft, thickened and expanded, and having spongy and very vascular new bone on its outer surface. The periosteum surrounding the new bone is thick and vascular, but is continuous with that investing the uninjured extremities of the bone.

From the Museum of Robert Liston, Esq.

684. A tibia, of which a great part of the wall of the shaft suffered necrosis.

New bone has been formed around nearly the whole of the shaft, and is invested by a thick periosteum continuous with that surrounding the extremities of the original wall. There are several apertures in the new bone. Opposite the two largest of these the exposed surface of the dead bone is smooth, being formed by the outermost layer of the wall of the tibia. At the junction of the shaft with its superior epiphysis several ulcerated apertures lead into deep cavities.

The patient was a boy who had laboured under the disease for several months. He recovered after amputation.

From the Museum of Robert Liston, Esq.

685. A tibia, of which nearly all the anterior and posterior walls of the shaft suffered necrosis. The dead portion is surrounded by an irregular deep groove, and its anterior part is perforated by numerous small apertures, through which the cancellous tissue appears more than usually vascular. A large quantity of new bone has been produced. The case which it forms is incomplete at the anterior and inner part, where the outer layers of the original wall perished; and, at the outer part, is continuous with that portion of the wall of the original shaft which survived. A periosteum invests all the new bone, and is continuous with the periosteum surrounding the epiphyses and the surviving portion of the shaft, as shown at the back of the preparation. Near the union of the shaft with the epiphyses, are several small round apertures, some of which pass through the new bone. The superior internal articular surface of the tibia, and the cartilage covering it, are perforated by a small round aperture with smooth edges, through which pus escaped from the head of the bone into the knee-joint.

The necrosis was of six months' duration. The knee-joint, after amputation, was found full of pus.

From the Museum of Robert Liston, Esq.

686. A tibia and fibula, macerated and dried. A large portion of the tibia, comprising nearly the whole of its anterior and inner walls, and the upper and lower parts of its posterior wall, suffered necrosis. A considerable

quantity of new bone has been formed around the dead shaft; but, as in the preceding specimens, there is no new bone opposite any of the parts at which the exposed surface of the dead bone, being formed by the outer layers of the wall, is smooth.

From the Museum of Robert Liston, Esq.

Specimens of similar Necrosis of portions of the superficial, and portions of the deep, layers of the wall, in other parts of the Museum :—

Nos. 738, 742-3-4, 747, 749, 769, 770, 3162-3-4, 3168, 3177-8, 3180, 3184, 3186-7, 3209.

g. Necrosis of portions of the middle or inner layers of the wall of a Bone.

687. Vertical sections of the middle of the shaft of a femur, exhibiting a small cavity in its anterior wall, from which, it is probable, a sequestrum has been removed. The front boundary of this cavity is covered with new bone, and opens externally. The adjacent parts of the shaft are enlarged, and increased in density; and new bone, like that formed in syphilitic ulceration, has been produced on all parts of their surface.

Hunterian.

688. Portion of the lower part of a femur, of which the walls are slightly thickened, and made irregular by the formation of new bone upon their external surface. On the anterior part of the bone is a round aperture, about two lines in diameter, leading to a very small dead piece of the inner part of the wall, and the adjacent part of the cancellous tissue.

From a woman fifty years old. A large abscess formed on the front of the thigh, and after communicating with the bursa above the knee-joint, opened externally. Profuse discharge ensued, and the patient became hectic. Amputation was performed, and she recovered.

From the Museum of Robert Liston, Esq.

Specimens of Necrosis of the middle and inner layers of the wall, in other parts of the Museum :—

Nos. 678, 683?, 708.

h. Necrosis of Cancellous Tissue.

689. A vertical section of the lower half of a tibia, exhibiting necrosis of a large portion of the cancellous tissue, and of the centre of its articular surface. In this section the lowest part alone of the dead bone remains. A bristle is passed through it; and it is further distinguished by the peculiar aspect of its lamellæ, from which, without any apparent change in themselves, the medullary membrane has been removed, as from a bone macerated after death. The dead bone is surrounded by a layer of soft vascular granulations formed in the adjacent cancellous tissue. A cavity, lined by similar granulations, extends for more than three inches up the interior of the shaft; within this cavity the remainder of the dead bone was enclosed. The wall of the tibia is thickened, and its external surface is irregular. *Hunterian.*

690. Another section of the same tibia, including the remainder of the dead and separated cancellous tissue. Bristles are passed into the cavity containing the dead bone, through several fistulous canals in the wall, which is in every part thickened, spongy, and more than usually vascular. *Hunterian.*

691. Section of the lower part of a tibia, in which a portion of the cancellous tissue, with a small piece of the adjacent wall, suffered necrosis, and is partially separated. The cavity containing the dead bone, together with a wide channel leading through the wall of the shaft, have, for distinctness' sake, been painted dark brown. *From the Museum of Sir A. P. Cooper.*

692. Part of a tibia, in which necrosis has affected a portion of the cancellous tissue near its lower extremity. The dead bone lies loose in a large cavity within the shaft, which opens by several wide orifices through the walls, and through the articular surface into the ankle-joint. The whole of the articular surface is destroyed. The wall of the bone

around the cavity is thin, light, and porous; above it, the walls are thickened and indurated, and appear as if there had been a large ulcer of the soft parts on the front of the leg. *Hunterian.*

693. A portion of cancellous tissue, separated, after necrosis, from one of the extremities of the tibia of "a strumous girl."

Presented by J. Moore, Esq.

694. Part of a femur, in which a compound fracture occurred, just above the condyles. A portion of the cancellous tissue perished, and is contained in a large cavity between and behind the ends of the bone. This cavity has vascular walls, and an external opening through a fistulous passage above the inner condyle. The ends of the fractured bone are rounded and smooth; but no process of union has taken place. *Hunterian.*

695. Parts of a tibia and fibula. There has been necrosis of a portion of the cancellous tissue of the head of the tibia. All the upper part of the shaft is enlarged, and its exterior is thickened, irregular, and covered with spongy new bone. On its surface are three large apertures, which lead into a cavity occupying nearly all the interior of the head of the bone. By the side of one of these apertures, a portion of the compact tissue appears to have been fractured, driven inwards, and partially re-united. The exterior of the lower part of the shaft is slightly thickened and rough.

These changes were the consequences of a fracture of the tibia. Amputation was performed below the knee, and the cavity in the head of the tibia was sawn across. On the 10th day after the operation hemorrhage from the stump took place. The blood was found to proceed from the part of the cavity in the tibia which had been left. This was, therefore, filled with lint: the hemorrhage did not recur, and the union by granulation proceeded favourably.

From the Museum of Robert Liston, Esq.

Specimens of Necrosis of the Cancellous Tissue in other parts of the Museum:—

Nos. 709, 730, 745, 758-9, 760, 764, 768 to 771, 1000, 3166, 3169, 3188, 3190, 3210 to 3213.

i. Necrosis of the Articular portions of Bones.

696. The extremity of a thumb, divided vertically. The last phalanx, separated after necrosis, lies in a cavity surrounded by granulations, part of which separate it from the articular surface of the first phalanx. "The joint was thus prevented from communicating with the dead bone, which might therefore have been removed without opening the joint or hurting the second bone."—*Hunterian MS. Catalogue.*

See also No. 677, and the Hunterian description of it at page 132.

697. The upper end of a tibia, in which there has been necrosis of a small portion of the cancellous tissue, and of the compact articular surface over it. The dead bone is contained in a cavity lined with a thin soft membrane, from which it has been pushed for a short distance upwards into the knee-joint. The corresponding half of the articular surface of the tibia is destroyed; its cartilage is removed, and the bone covered with a thin layer of granulations; but the other half of the articular surface is sound. *Hunterian.*

698. The lower extremity of a tibia, from the articular surface of which a thin plate of bone has been exfoliated. The dead bone is now artificially attached to the part from which it separated. All the surrounding cartilage has been removed by ulceration. *Hunterian.*

699. A knee-joint, in which there is a small loose portion of cancellous tissue, separated from the middle of the head of the tibia. The dead bone rests in the cavity from which it separated, and of which the walls are smooth, and appear partially lined with a tough membrane. All the articular cartilages have been removed by ulceration; the borders and surfaces of the bones are nodulated, and, for the most part, covered with tough fibrous tissue. In the lower part of the external condyle of the femur is a depression corresponding with the sequestrum separated from

the tibia. The patella is united by fibrous tissue (which has been partially divided) to the external condyle of the femur.

Presented by Sir William Blizard.

700. A vertical section of a knee-joint. A portion of the external condyle, about three-fourths of an inch in diameter, and including part of the articular surface, having suffered necrosis and separated, lies in the cavity of the joint, loose, but partly imbedded in the deep cavity remaining, after its separation, in the lower part of the condyle. The surface of this cavity is quite hard and smooth, like that of bone subjected to friction, and is slightly grooved in the direction of the motions of the joint. All the articular cartilages have been removed; the exposed surfaces of bone are rough and nodulated; the synovial membrane is thickened, and at the anterior part a prolongation of it with a mass of adipose tissue has grown far into the joint.

Presented by Sir William Blizard.

Specimens of Necrosis of the articular portions of bones, in other parts of the Museum :—

Nos. 669 to 674, 677, 689, 690, 704, 710, 762-3, 3173, 3184.

j. Necrosis of Diseased Bone.

701. A tibia, from which a large piece of the middle of the anterior wall has been exfoliated. The sequestrum has an aperture in its centre, and is porous and uneven from the effects of inflammation and ulceration previous to its necrosis. A small sequestrum is partially separated from the posterior part of the tibia, and there is a large aperture in its wall near the tuberosity. The remainder of the shaft is covered with irregular deposits of new bone.

Hunterian.

702. Part of a tibia, from the anterior surface of which a thin oval portion of the wall was exfoliated, after being ulcerated and irregularly thickened. The borders of the shallow cavity left after the exfoliation are bounded by healthy new bone, beneath a part of which are two small sequestra, the separation of which is not completed.

Hunterian.

703. The portion of dead bone from the tibia last described. *Hunterian.*

704. Part of a tibia, of which a large portion, including its lower articular surface, has been nearly separated after necrosis. Previous to its death, the portion of bone was deeply and irregularly ulcerated, the inferior and external articular surfaces being destroyed, and only a small portion remaining of the internal malleolus. The greater part of the adjacent wall of the shaft has been also removed by the extending ulceration.

Hunterian.

705. The upper part of a skull, from which, in the course of syphilitic disease, a large portion of the frontal and parietal bones of the right side, after being tuberculated and deeply ulcerated, suffered necrosis and were exfoliated. The remaining portion of the skull is thickened, and greatly increased in weight; the sutures are obliterated, and the diploe is replaced by compact heavy bone. It is, also, deeply and irregularly ulcerated on the greater part of both its surfaces, and in many situations the ulceration has perforated both the tables; but there is less ulceration on the inner surface of that portion of the skull from which the exfoliation has taken place than on any of the adjacent parts. The dura mater, of which the greater part is reflected from the interior of the skull, has several small portions of bone adherent to its outer surface.

From the Museum of Robert Liston, Esq.

Specimens of Necrosis of New, or of Diseased Bone in other parts of the Museum :—

Nos. 586 to 592, 605-6, 631, 633, 706 to 709, 713, 752-3, 3127 to 3133, 3137, 3153.

k. Double Necrosis.

706. The upper part of a sternum, with parts of the clavicles and of the first pair of ribs. A portion of the sternum nearly an inch in its greatest diameter, and situated close to the articulation of the right first rib, has perished, and is almost separated by a deep groove from the bone around it. This surrounding bone is rough and spongy, and, at the distance of about half an inch from the sequestrum just described, is separated by a

shallow groove from the adjacent healthy bone. It therefore seems that after the necrosis of the portion first described, and its nearly complete separation, a second portion, in the form of a ring around the first, perished, and was in process of separation when the patient died.

The patient was an old man, and there was an abscess in the anterior mediastinum.

From the Museum of Robert Liston, Esq.

707. A tibia, of which a considerable portion of the shaft suffered necrosis. About two inches above the ankle-joint, the lowest limit of the dead bone is marked by a deep groove which surrounds it, and has nearly separated it; but higher up, and especially on the anterior aspect, the division between the dead and living bone cannot be clearly traced. On the inner aspect, the necrosis extends to within two inches of the tubercle of the tibia; and here, also, it appears as if one portion of the bone had perished some time before the other, for within the outermost groove, which bounds the whole of this part of the dead bone, is another enclosing only a portion of the spine of the tibia, and beyond which a part of the dead shaft had at some earlier period been covered with new bone. New bone has, also, been deposited on the surface of all that part of the shaft which did not perish.

Presented by Sir William Blizard.

708. Two sequestra, exfoliated from the front of a tibia. The larger sequestrum consists of a portion of the outer layers of the shaft thickened, increased in density, and partly covered with new bone. In its centre is a circular aperture, with smoothly rounded borders, immediately beneath which, and exactly adapted to a cavity in its under surface, the smaller sequestrum lies. It is probable that a portion of the inner wall of the tibia, comprised in the smaller sequestrum, first suffered necrosis, and, exciting inflammation, gave rise to thickening and other changes of the bone around it, as well as to the ulceration of the bone immediately over it; of which ulceration the effects are seen in the fistulous opening through the centre of the larger sequestrum, and in the

shallow cavity on its inferior surface. The larger sequestrum must have perished and separated after these changes had taken place; probably its necrosis was the result of its being exposed by ulceration of the soft parts over it.

Hunterian.

709. A sequestrum, from a fibula, with the new bone which had formed around a portion of it, and exfoliated with it after secondary necrosis.

Hunterian.

l. Necrosis from Peculiar General or Local Causes.

710. A tibia and fibula, in which necrosis, together with sloughing of the foot, ensued in consequence of obstruction of the circulation through the leg, produced by an aneurism. The dead portion of the tibia includes the external malleolus, all the inferior articular surface, and a piece of nearly the whole thickness of the shaft about four inches long. The dead is separated from the living bone by a broad superficial groove, and is in several situations covered with a thin layer of new bone. The rest of the shaft, nearly as far as the tuberosity, is covered with new bone. In the fibula a portion of the outer part of the shaft, extending about three inches above the malleolus, perished. The dead bone is encompassed by a groove, which passes through a layer of new osseous matter deposited on part of the bone in an earlier period of the disease. A similar layer of new bone covers nearly all the remainder of the shaft.

The patient had a large popliteal aneurism. His foot mortified and dropped off, and the lower ends of the tibia and fibula were exposed; but he died before the separation of their dead portions was completed. The femur of the same patient, of which a large portion of the lower end was destroyed by the pressure of the aneurism, is preserved in No. 3099.

Hunterian.

711. A tibia, fibula, and astragalus. The tibia exhibits appearances consequent on necrosis of a large portion of its wall. The superficial layers of nearly

the whole of the anterior part, and of considerable portions of the posterior and inner parts of its walls, have perished. The extent of the dead bone is marked by a shallow groove, about a line in width, completely surrounding it, and separating it from those parts of the wall which did not perish. The surface of the latter is thinly covered with spongy, grey, new bone. Near the epiphyses the walls of the tibia are ulcerated. Its articular surface at the ankle-joint is also ulcerated, nearly all the layer of compact tissue being removed. There are similar appearances of ulceration on the corresponding surface of the astragalus; and part of the inner wall of the fibula is thickened and spongy.

The patient was a boy twelve years old, who had severe phlegmonous erysipelas of the leg, which had been neglected before his admission into the Edinburgh Royal Infirmary. Extensive abscesses formed, with sloughs of the cellular tissue, and, his health declining, amputation was performed.

From the Museum of Robert Liston, Esq.

712. A tibia, fibula, and patella, with part of a femur. Several portions of the external wall of the tibia, some of which are of large size, have suffered necrosis, and were in process of exfoliation, grooves of various depths having formed around them. The intervening portions of the wall are rendered uneven by irregular deposits of new bone, and near the epiphysis the walls are deeply ulcerated. Extensive ulceration has also taken place in the knee-joint, and the greater part of the articular surfaces of the femur, tibia, and patella has been removed.

These changes occurred in a case of acute phlegmonous erysipelas of the leg, with suppuration and sloughing of the cellular tissue.

From the Museum of Robert Liston, Esq.

713. Part of a femur, in which the lower fourth of the shaft, after necrosis and ulceration, has separated, in maceration, into numerous fragments of various size. The largest fragment is nearly four inches long, and consists of cancellous tissue, surrounded by part of the original wall thinned and made rough by ulceration: the other fragments are very small. The condyles have separated into several pieces, but their articular surfaces are unaltered.

The end of the part of the shaft at which this destruction was limited is irregularly ulcerated, and covered with new bone; the rest of the shaft appears healthy.

From a scrofulous girl. It is most probable that this specimen shows the effects of necrosis in diseased bone; yet it is possible that the part of the bone reduced to fragments was involved in the growth of some large tumour.

From the Museum of R. B. Walker, Esq.

714. A skull, in which, in the course of syphilitic disease, large portions of the superior maxillary and palate bones, as well as the whole of the vomer, were destroyed. There is a large irregular hole through the middle of the palatine portions of the superior maxillary bones; and one of smaller size exists in each of the same portions of the palate bones. The parts of the maxillary bones which form the anterior walls of the nose suffered necrosis; and a portion of each, of the same form and size, is separated by a deep groove from the adjacent bone. The alveolar border did not entirely perish, but on the right side only a thin layer of it remains. All the incisor teeth are absent; but those of the right side must have been removed long before the necrosis occurred, for their sockets are closed, and a great part of the alveolar border has been absorbed.

From a man twenty-four years old, who died with syphilis.*

From the Museum of R. B. Walker, Esq.

715. A lower jaw, portions of which have suffered necrosis, in consequence, probably, of the use of mercury. The dead portions are of the same form and size on each side. They extend, in length, from the bases of the coronoid processes to the sockets of the two first bicuspid teeth, and, in depth, to within a quarter of an inch of the lower margin of the jaw. The separation of each is nearly completed at the outer and anterior part, but at the inner part has made little progress. The adjacent parts of the jaw are roughened by superficial deposits of new bone.

From the Museum of Joshua Brookes, Esq.

* On the occurrence of necrosis in syphilitic disease, see p. 119, after the description of No. 637.

SERIES XII.—Sub-Series 5.—Section B. NECROSIS OF PARTICULAR BONES.

716. Nearly half the frontal portion of an os frontis, which separated after necrosis consequent on injury.

The patient was a boy about four years of age, who fell from the back of a horse upon the stone pavement, and severely lacerated the scalp covering the upper and fore part of the head. An attempt at re-union of the wound failed, and inflammation and considerable suppuration followed the accident. The child, who had every appearance of good health at the time he received the injury, was seriously ill for a week: the wound did not heal, till, at the expiration of six months, the portion of bone here preserved was removed. Ultimately, the child, who was a patient of the Middlesex Hospital, completely recovered.

Presented by W. Pretty, Esq.

717. Part of a skull, from which the left temporal bone separated after necrosis. The trunks of the trigeminal and facial nerves, the principal divisions of the former, the remains of the Casserian ganglion, and the nerves proceeding from it, are dissected from the diseased mass in which they were involved.

The following account of the case is given by Mr. Swan in his "Treatise on Diseases and Injuries of the Nerves," London, 1834, p. 291 :—

William Sharp, eleven years of age, had a purulent discharge from the left ear, which began in the spring of 1824, kept gradually increasing, and became very offensive. Blisters were applied many times behind the ears, and tonic medicines administered without producing any good effect on the local disease, although his general health was improved by them. About the end of March, 1825, the integuments around the ear became swollen and painful, and the whole side of the face was enlarged. At this time the discharge was very copious and offensive; he had frequent pains in the head, and over the left eye. On passing a probe into the meatus, the bone was found to be denuded: his health had declined and tonic medicines were of no use. In December it was observed that the left side of his face was nearly paralytic; he had violent pains in the head and face, which were much aggravated at night, and for which he took an opiate, with some relief. He was frequently drowsy, and sometimes nearly comatose. In February, 1826, there was some inflammation of the conjunctiva of the left eye, which went off in a few days. On the 12th of October the left temporal bone appeared to be quite loose in the wound, and was easily extracted. About a week before this time his right eye became amaurotic, the pupil was dilated, and the

lids closed. On the 14th he became insensible, but cried out when touched. On the 16th a large vesicle formed at the inferior part of the left cornea; and the greatest part of the cornea had become opaque. The right cornea was not altered. He had slight convulsions, and when the left side of his face was touched he flinched. He died in the night.

He walked about until the last few days. He had generally a good appetite. His food appeared to digest properly, and, indeed, all the functions of the viscera of the chest and abdomen were perfectly performed. He could talk distinctly. The left side of his face was nearly paralytic, and the left side of the nose was completely drawn to the right side. When he cried out, so as to exert the muscles of the face much, it was observed that those of the right side had very great power over those of the left; but the mouth, when shut, appeared even, and would not then have been supposed to be paralytic. From the end of last March the pain in the right side was very severe, he shrieked very much, and the opiate did not relieve him. His manner became altered, and he was unwilling to answer questions. He was generally easier in the day, and spent much of it sleeping in the sun.

Examination.

This took place on the 17th of October, at 11 A.M. The dura mater was rather more vascular than is usual. The arachnoid membrane was much thickened, and especially on the right side; and there was much fluid between it and the pia mater. The pia mater was very vascular. There was much fluid in the lateral ventricles. The portion of brain which lay over the part from which the temporal bone was separated, was protruded into a hernia, and the inferior cornu of the lateral ventricle was thereby drawn out of its course: the brain at this part was softer than natural, but the rest of it was sound. The origins of the nerves were distinct.

The third branch of the fifth pair was in a state of ulceration, near its beginning from the Gasserian ganglion: the gustatory, dental, and buccal nerves were, however, quite attached to it, and, indeed, did not appear to have suffered.

The auditory and facial nerves terminated in a bulbous mass on the dura mater. The facial nerve could with difficulty be traced in the face near the edge of the jaw, on account of the inflammatory process which had been going on there. It could, however, be distinctly seen to communicate with the dental nerve, and then terminate in a confused mass, which formed the walls of the cavity containing the exfoliating bone.

The par vagum, the glosso-pharyngeal, and the accessory nerves were sound, and passed just behind the walls of the same cavity.

The internal carotid artery, from above and below, could be traced as far as the walls of the cavity, and was then lost. It was reduced to a small size, however, before it reached the walls of the cavity, and was impervious.

The superior cervical ganglion of the sympathetic nerve terminated in the walls of the cavity. The branches given off from the sixth, which usually go to the superior cervical ganglion, were very small, and terminated with the internal carotid: the superior cervical ganglion itself appeared natural.

The vidian nerve was perfect from its connection with the sphenopalatine ganglion. The superior branch could be traced a short distance, but soon became much smaller than usual: the inferior branch could be traced a little way, it then became very small, and the branches from the sixth could be traced the same distance; and both of these terminated with the internal carotid artery, in the walls of the cavity.

The condyloid process of the lower jaw was exfoliating. The whole of the temporal bone had exfoliated; and, to compensate for it, the orbital plate of the frontal bone had become unusually thick, and all the bone in the neighbourhood of the disease had a firmer texture than is observed at his age. The pericranium round the opening at which the hernia protruded was much more vascular than in the other parts.

A considerable portion of the brain had protruded, like a fungus, into the cavity left by the exfoliated bone; it had been forming gradually, and was, no doubt, the cause of his death.

The quantity of fluid contained in each ventricle was the same, and, therefore, the blindness of the right eye did not depend on this as its cause; for vision remained in the left after the right one was blind.

In the examination, a black pin was found in the cavity which had contained the exfoliated bone. Pins had not been used to confine the dressings; the question therefore is, whether it had been forcibly introduced into the ear, and occasioned the disease; but this could not be ascertained.

It will be seen from this very curious case, that the sympathetic may be partly destroyed, and the general health remain unimpaired, as we have a right to presume after a due consideration of all the circumstances which have been related. We may conclude, therefore, that although the sympathetic nerve produces a general sympathy in the body, yet that each ganglion has a somewhat local influence, inasmuch as it more particularly connects the parts giving and receiving branches from it, so as to associate them in complicated operations. Both the sphenopalatine ganglion, and the vidian nerve, were first of their usual size, then each branch of the vidian was diminished. Can it be presumed from this that the branches of the vidian are going to, and not coming from, the sympathetic nerve?

The functions of the facial nerve must have been entirely suspended, and, from the evenness of the mouth when at rest, and from his ability to speak so well, I cannot help concluding that the branches of the fifth had very considerable power in exciting the action of the muscular structure of the lips.

Presented by Joseph Swan, Esq.

718. The lower part of the parietal bone, with the subjacent dura mater, and a portion of brain, from the child whose case is just related. This portion of the brain is protruded below the edge of the bone, through an ulcerated aperture in the dura mater, which lined the squamous portion of the temporal bone.

Presented by Joseph Swan, Esq.

Other specimens of Necrosis of the Skull :—

Nos. 605-6, 633, 662-3-4, 705, 3127 to 3133, 3137, 3142 to 3153.

719. The ossa nasi of a young man, which separated, nearly entire, after necrosis.

The patient had had syphilis seven years before the separation of the bones, and had taken a large quantity of mercury.

From the Museum of Robert Liston, Esq.

720. Portions of the upper and lower maxillary bones of a child, exfoliated in consequence of necrosis. The largest portion of the upper maxillary bone is from the right side, and includes the last two molar teeth, one of which is still enclosed within its capsule. Another and smaller portion from the upper jaw includes one of the bicuspid teeth. The exfoliation from the lower jaw comprises the posterior wall of its middle portion, as far as the first molar tooth on each side. On the posterior surface of this portion, new bone had been deposited before the exfoliation took place.

From the Museum of John Howship, Esq.

721. Part of a lower jaw, ulcerated, and separated after necrosis.

Hunterian.

722. The greater part of the left half of a lower jaw, exfoliated after necrosis. Previous to the necrosis the whole surface of the bone had been irregularly ulcerated, and porous, grey, new bone had been formed on it in small scattered patches.

From the Museum of George Langstaff, Esq.

723. A lower jaw, from which all the alveolar border, from the symphysis to the second molar tooth on each side, has been removed, probably in consequence of necrosis. The remaining bone is sound, and its surface, from which the separation took place, is covered with a smooth layer of compact substance. The separated portion included the anterior part

of the inferior dental canals, each of which now opens by a wide orifice in the margin of the remaining bone.

From the Museum of Sir A. P. Cooper.

724. An entire vomer, separated from its articular connections after necrosis.

From the Museum of Sir A. P. Cooper.

Other specimens of Necrosis of the Bones of the Face :—

Nos. 714-5, 3154.

725. A rib, from which a considerable portion separated after necrosis. That which remains is healthy in structure, and its surfaces and edges are smoothly healed.

From the Museum of Robert Liston, Esq.

726. Two thin sequestra, from the rib in the preceding preparation. One of them is about three inches in length, and includes a large portion of the outer wall of the rib.

The patient was a young man, in whom paracentesis thoracis had been performed for empyema, under which he had laboured for a year. The sequestrum separated some months after the operation, but the discharge of pus from the wound continued, and the patient died hectic between five and six years afterwards.

From the Museum of Robert Liston, Esq.

727. Several small portions of bone, marked “Bones voided by urine, after a blow on the lower part of the back, by Mrs. Wiltshire, recovered. Dr. Lewis attended her during the illness.” They are chiefly thin scales of apparently healthy compact bone; one of them is like a portion of the transverse process of a vertebra; none of them have the aspect of ordinary sequestra.

Hunterian.

728. The greater part of a clavicle, including its sternal extremity, and three-fourths of its shaft, separated after necrosis.

The patient was a girl fifteen years old.

From the Museum of Robert Liston, Esq.

Other specimens of Necrosis of the Vertebrae, Sternum, and Scapula :—

Nos. 706, 1000, 3155-6.

729. The upper half of a humerus, in which has been necrosis of a portion of the wall and cancellous tissue immediately below the head. The sequestrum, which is more than six inches long, lies loose in a large cavity in the upper part of the shaft; and one of its extremities projects through an ulcerated aperture in the articular surface of the head. There are three other large apertures leading through the inner and anterior parts of the shaft, into the cavity containing the sequestrum, and a small one low down extends through the outer wall. The walls of the rest of the shaft are enlarged, and heavy, but there is not much new bone on them.

From the Museum of Robert Liston, Esq.

Other specimens of Necrosis of the Humerus :—

Nos. 678, 3157 to 3160.

730. The bones of an elbow-joint. There has been necrosis with ulceration of a small part of the outer condyle of the humerus, and a portion of its cancellous tissue remains only partially detached from the adjacent bone, from which it may be distinguished by its spongy texture and dead-white colour. New bone is deposited in irregular pointed processes around the seat of the necrosis, and in small quantity upon the upper parts of the radius and ulna. The shafts of all the bones are light, soft, and greasy; but their articular surfaces are sound.

The patient was a woman thirty-two years old, in whom the disease had existed sixteen years. She recovered after amputation of the arm.

From the Museum of Robert Liston, Esq.

Other specimens of Necrosis of the Radius and Ulna :—

Nos. 456, 680, 3161 to 3165.

731. The bones of a finger. Nearly the whole of the interior of the first phalanx has been destroyed, and four large round apertures lead through

the walls into the cavity within it. The walls themselves are expanded. The articular surfaces, and the other phalanges, are healthy.

Probably these changes were consequent on necrosis of a portion of the cancellous tissue.

From the Museum of Robert Liston, Esq.

732. The remains of a digital phalanx, after necrosis and exfoliation of nearly the whole of the middle of its shaft. New bone of light and porous texture is deposited upon them. *Hunterian.*

733. The bones of a finger, amputated with the distal end of the metacarpal bone. A considerable part of the wall of the first phalanx has suffered necrosis. Portions of sequestra have separated from the palmar surface of the bone, and part of its dorsal surface is exposed in a state of necrosis. The adjacent living parts of the shaft are covered with a thin layer of new bone. The articular surfaces are uninjured. Both the other phalanges are superficially ulcerated, and part of the dorsal surface of the second appears to be marked out for exfoliation by a groove surrounding it.

The disease was of only six or seven days' duration. The tendons of the finger were destroyed.

From the Museum of Robert Liston, Esq.

734. The bones of a little finger, and the distal half of its metacarpal bone. The last phalanx is healthy; the proximal extremity of the second is deeply ulcerated, and its articular surface is destroyed; of the third, two small detached portions alone remain, and these appear to have separated after necrosis. The articular surface and the distal end of the metacarpal bone are deeply ulcerated; its shaft is covered by new bone.

Amputated from an old boatman. The disease was of only eight or ten days duration.

From the Museum of Robert Liston, Esq.

735. A thumb, in which there has been necrosis of the whole last phalanx.

The exfoliated phalanx is exposed by a section, made after amputation, through the palmar aspect of the thumb. A bristle is passed into the cavity in which the phalanx lies, through an opening on the dorsal aspect of the thumb, where an abscess pointed and burst.

The disease had at first the characters of deep-seated whitlow, and was not actively treated.

From the Museum of George Langstaff, Esq.

736. The greater part of the last phalanx of a thumb, exfoliated after necrosis.

Presented by — Fowler, Esq.

737. Portions of three digital phalanges, separated after necrosis; viz., 1. The distal articular extremity of the first phalanx of a thumb, exfoliated in the twelfth week after the formation of a deep abscess around it. 2. The proximal articular extremity of the last phalanx of a little finger, exfoliated in the tenth week from the commencement of the disease. 3. Nearly the whole of the last phalanx of a thumb, exfoliated in a case of whitlow.

From the Museum of John Howship, Esq.

Other specimens of Necrosis of the Bones of the Fingers and Metacarpus:—

Nos. 641 to 644, 696.

738. A femur, several parts of which have suffered necrosis. The whole bone, with the exception of the head, neck, and lower epiphysis, has in consequence undergone changes. Around, and through an extent of about three inches below, the great trochanter, the shaft is enlarged, and its surface is made uneven by projecting points and plates of new bone. In this part, also, are several round apertures leading to the interior of the bone, in which there is a portion of cancellous tissue nearly two inches long, separated after necrosis. For an extent of two inches below this part, which was sawn through in amputation, the shaft is scarcely larger than is natural, but its exterior is uneven. In the lower half of the bone, the wall, through a length of about four inches, and through nearly two thirds of its circumference, has exfoliated. The anterior part of the wall, which did not perish, is considerably thickened. At the posterior part, a large

quantity of new bone has been produced, some of which projects far over the sequestrum, so as to lock it in, though without forming a complete case around it. Below this sequestrum, and within an inch of the epiphysis, the femur is traversed from behind forwards by a fistulous canal, in the course of which is a small portion of necrosed cancellous tissue.

The patient was a boy eight years old, in whom the disease, attributed to a fall upon ice, had existed for more than a year. Before amputation the limb was greatly swollen, and there were two fistulous openings at the lower part of the thigh, which led to the diseased bone. Amputation was performed, and on the 12th day repeated hemorrhages from the stump occurred. The common iliac artery was tied, and transfusion was employed with some benefit; but the patient died about twenty-four hours after the tying of the artery.

From the Museum of Robert Liston, Esq.

739. The lower half of a femur, of which a large portion of the wall suffered necrosis and separated. The sequestrum is upwards of four inches long, and in the greater part of its length comprises the whole circumference of the wall. The cancellous tissue within it is healthy, and a large quantity of new bone has been deposited on the shaft above and below the sequestrum, especially on the posterior surface of the part above it. There is extensive and deep ulceration of the bone at the lower end of the shaft close by the epiphysis; but the epiphysis itself is healthy.

Presented by Sir William Blizard.

740. Portions of a femur, including nearly the whole thickness of the shaft, and measuring in united length about four inches, which exfoliated after seven years' disease.

From the Museum of Sir A. P. Cooper.

741. The lower two-thirds of a femur, in which it is probable there had been necrosis of a portion of the cancellous tissue. The shaft is in every part enlarged, and its surface is rough, uneven, and beset with points and plates of new-formed bone. Several oval apertures traverse the thickened wall, and lead into a large cavity extending through nearly the whole length of the medullary tube. There are also several smaller apertures through

the articular surface of the bone, and through the cartilage. The substance of the condyles is light and soft, and their lateral surfaces are spongy.

The patient was a man forty-five years old. After he had suffered for some months with severe pain at the lower part of the femur, an abscess formed around the bone, which was evacuated by incision. Some time afterwards, the discharge continuing, and his health being much impaired, the limb was amputated. After the flaps had been formed the exposed bone was found thickened and uneven; but, the hemorrhage being profuse, it was sawn through, and ligatures were applied to the bleeding vessels. An incision was then made on the outside of the thigh upwards from the outer angle of the flaps, and the bone was sawn through at a healthy part, about three inches higher. The patient recovered. The portions, separately sawn off, are now connected.

From the Museum of Robert Liston, Esq.

742. A femur, with parts of the tibia and fibula, and the patella, exhibiting the effects of extensive necrosis of the shaft of the femur. The surfaces of the head, and of the lower part of the neck of the femur, are partially but deeply ulcerated. Around the trochanters the shaft is enlarged, and its surface is uneven. On its inner aspect, in the place of the lesser trochanter, is a large oval opening through its walls, which leads into a cavity in its interior, and communicates with another opening of smaller size, rather lower down, on the anterior aspect of the shaft. Within this cavity a portion of the inner part of the wall, nearly two inches long, lies completely separated after necrosis. At this part, all the cancellous tissue, and the internal laminae of the wall, seem to have perished by necrosis or ulceration; for the part of the wall which remains and encloses the cavity containing the sequestrum is thin and transparent. Below this cavity, the shaft, through an extent of about four inches, is entire, but much enlarged, and its surface is rendered irregular by deposits of new bone, especially on its posterior part. In the lower third of the femur, nearly the whole thickness of the shaft perished. A sequestrum, six inches in length, comprising nearly all the posterior inner and outer wall, and large portions of the cancellous tissue, and of the inner layers of the anterior wall, of this part of the femur, lies loose in a cavity within the new bone. This cavity is nearly open behind, and in front is imperfectly covered by

that portion of the shaft which did not perish, but is thickened and enlarged. The condyles are light and spongy, reduced in size, and altered in their form. The cartilages of the knee-joint are destroyed. The head of the tibia is superficially ulcerated, and, with the fibula, is dislocated backwards and outwards.

The patient was a man twenty-two years old. The disease had existed for eighteen months, and was believed to originate in a fall on ice. When the patient became hectic, and about to sink, amputation at the hip-joint was performed. He died on the second day after the operation.

From the Museum of Robert Liston, Esq.

Other specimens of Necrosis of the Femur :—

Nos. 458-9, 465, 554, 557, 656, 658-9, 660, 665-6-7, 687-8, 694, 700, 713, 3166 to 3172.

743. A tibia, in which, after necrosis of nearly the whole length and thickness of the shaft, an almost complete case of new bone was formed around the sequestrum. The epiphyses, with which the case of new bone is firmly and smoothly connected, are unaltered. The interior of the case is compact and nearly smooth: its exterior also is hard, but more rugged. There are several apertures in it, especially along its anterior part, through which the size and form of the enclosed sequestrum may be seen. The surface of the sequestrum is, in nearly every part, rough, comprising only a few scattered portions of the superficial laminæ of the original shaft.

Presented by Sir Everard Home.

744. A tibia, of which nearly the whole shaft suffered necrosis. The sequestrum comprises all the length of the shaft, with the exception of about an inch at each extremity, and, in some situations, includes the whole thickness of the wall. A considerable quantity of new bone is formed behind the sequestrum, but none anteriorly, except in one situation, a little below the tuberosity, where a thin scale is attached to the surface of the sequestrum. It is not improbable that this and some smaller portions near it were deposited on, and became adherent to, the surface of the bone after it had perished. *Hunterian.*

745. A tibia, in which there has been necrosis of numerous scattered portions

of the wall and cancellous tissue of the upper part of the shaft. All the diseased part is enlarged: a great quantity of new bone has been formed upon its external, and a still larger quantity upon its posterior, surface. There are several round apertures in the new bone, through which portions of sequestra may be seen in an internal cavity. The superior epiphysis is not diseased, but ulceration has penetrated deeply between it and the upper part of the shaft.

Presented by Sir William Blizard.

746. A tibia, in which there has been necrosis near the ankle-joint. All the lower part of the shaft and the epiphyses are enlarged, and their external surface is made irregular by deposits of new bone, through some round apertures in which small sequestra are seen. Ulceration into the ankle-joint has taken place, and the whole of the articular surface of the tibia is destroyed. The upper part of the shaft is irregularly enlarged and ulcerated; but no sign of necrosis having occurred is here observable.

Presented by Sir William Blizard.

747. A tibia, of which a portion, about ten inches long, comprising part of the cancellous tissue of the head, and nearly the whole thickness of the shaft, suffered necrosis. The sequestrum is completely separated, but is held in its place by the incomplete case of bone composed of the adjacent surviving parts of the shaft and the new bone formed on them. A small ulcerated opening leads into the knee-joint. On some parts of the sequestrum are portions of new bone, probably deposited before its death.

Hunterian.

748. A tibia, after necrosis of a narrow portion of nearly the whole length of its anterior wall, and of some of the subjacent cancellous tissue. A deep channel remains widely open along the front of the tibia, from which the sequestrum was removed. The lateral and posterior boundaries of this channel are formed of hard and heavy new bone, and of cancellous tissue, which is also much harder, closer, and heavier than is natural. The rest

of the shaft is enlarged, increased in weight, and covered with hard new bone. At the middle of its posterior wall is a round aperture leading into the channel just described. The epiphyses and the parts of the shaft immediately adjacent to them are healthy.

Presented by Sir William Blizard.

749. A tibia and fibula, from a young person. Nearly the whole length, and, in many parts, nearly the entire thickness, of the tibia have suffered necrosis. The dead bone is almost surrounded with a groove; but its separation is incomplete. A small quantity of new bone is formed on the outer surface of those parts of the shaft which did not perish; but, near the articular ends, these portions are deeply ulcerated. The lower epiphysis, also, is almost destroyed by ulceration. The fibula is healthy.

Presented by Sir William Blizard.

750. Section of a tibia, of which a portion about two inches long, near the inferior extremity, separated after necrosis. The sequestrum is enclosed in a cavity, of which the walls are chiefly formed of new bone, and into which several small round apertures lead. The whole shaft of the tibia is thickened; its surface is uneven and porous; and its medullary tube, diminished in size by the thickening of the walls, is almost filled with compact osseous tissue.

Presented by Sir William Blizard.

751. The other section of the same tibia, showing the rest of the cavity in which the sequestrum lay, with its walls formed of healthy and thickened cancellous tissue.

Presented by Sir William Blizard.

752. A section of the upper part of a tibia, of which the shaft, about four inches below the head, suffered necrosis in its whole thickness. The exterior of the dead portion is rough, several sequestra from the outer layers of the wall having been removed before the limb was amputated. The periosteum above the dead bone is thickened, and part of it is covered with granulations.

Presented by Joseph Swan, Esq.

753. Another part of the same tibia, including the remainder of the dead bone, and exhibiting similar appearances.

The case is related in "A Treatise on Diseases and Injuries of the Nerves," by Joseph Swan. London, 1834, p. 77. The patient was a man forty-eight years old, in whom the disease had existed for several months. There was a large ulcer on the leg, over the diseased bone, which often bled profusely, and was attended with excruciating pain, coming on in paroxysms, accompanied by involuntary movements of the limb. The peroneal nerve, in the distribution of the branches of which the pain was chiefly felt, was divided, and an inch of its trunk was removed from the ham. After the operation the severe pain and spasms of the limb ceased, and the patient seemed for some time to improve in health. Several pieces of bone exfoliated or were extracted; but about six weeks after the operation the patient's health again declined, and the limb was amputated.

Presented by Joseph Swan, Esq.

754. The upper third of a tibia. Between the tubercle and the anterior border of the articular surface is a deep ulcerated cavity, at the bottom of which is a black sequestrum, partially detached. The surrounding surface is covered with irregular deposits of new bone. The articular surface is healthy.

The patient was a man twenty-two years old. There was an abscess under the ligamentum patellæ, but external to the joint. The exfoliation was consequent on the application of the cautery. He recovered after amputation of the limb.

From the Museum of Robert Liston, Esq.

755. The upper part of a tibia, from the front of which a large portion has exfoliated, leaving a deep cavity, completely open anteriorly, and with its posterior and lateral walls formed of compact heavy bone. The shaft below this cavity is enlarged; its surface is uneven, its tissue hard and heavy, and its medullary tube nearly obliterated.

Presented by Sir William Blizard.

- 755A. A tibia, in which, probably after the separation of a large portion of dead bone from the front wall, the remaining substance of the shaft is enlarged, and increased in weight, its cancellous tissue and walls being consolidated into a nearly uniform, hard, and porous tissue. A small sequestrum of

cancellous tissue is suspended by the side of the tibia; and in the place whence, it is probable, large sequestra were removed, is a large shallow cavity or channel, with widely everted edges. The upper and lower parts of the shaft are healthy. *Presented by Sir William Blizard.*

Other specimens of Necrosis of the Tibia :—

Nos. 457, 479, 555, 558, 586 to 592, 631, 657, 661, 668, 676, 679, 681 to 686, 689 to 693, 695, 697-8-9, 701 to 704, 707-8, 710-1-2, 3173 to 3205.

756. Part of a fibula, which, including upwards of four inches of the whole thickness of the shaft, having suffered necrosis, was in process of exfoliation. The shaft above the sequestrum is enlarged by the formation of new bone upon its surface. *Hunterian.*

757. A portion of a child's fibula, about five inches long, exfoliated after a burn. It comprises nearly the whole thickness of the shaft.

Presented by J. Ring, Esq.

758. The lower end of a fibula, of which the cancellous tissue, and a great part of the wall of the outer malleolus, have separated after necrosis. The sequestrum is loose in an incomplete cavity, chiefly formed of new bone; the whole of the lower end of the fibula is enlarged. *Hunterian.*

Other specimens of Necrosis of the Fibula :—

Nos. 673-4, 709, 710, 3206 to 3209.

759. Parts of a tibia and fibula, with the bones of the foot, displaying the effects of necrosis of part of the cancellous tissue of the os calcis. Three small round apertures in the wall of the os calcis lead to a cavity in its interior containing a small sequestrum. Irregular deposits of new bone have taken place about the ankle-joint, the sheaths of the tendons, and the articulation between the os calcis and os cuboides.

From a woman forty years old, in whom the disease had long existed. She recovered after amputation.

From the Museum of Robert Liston, Esq.

760. Section of an os calcis, dried after the minute injection of its blood-vessels. A portion of the bone, separated after necrosis, lies loose in a cavity with very vascular walls; and another cavity, partially separated from the preceding, from which a sequestrum has probably been removed, is situated lower down, and opens externally by a round aperture through the wall of the bone.

From the Museum of Sir A. P. Cooper.

761. The other section of the same os calcis, together with the adjacent tissues and the integuments, not dried. The preparation shows, besides the conditions mentioned in the last description, a layer of granulations lining the cavity containing the sequestrum, and two small ulcerated apertures in the adjacent integuments.

From the Museum of Sir A. P. Cooper.

762. The lower end of a tibia, with part of the astragalus. The upper half of the astragalus has been removed by ulceration. Its remaining portion, dead and deprived of its articular cartilages, lay loose in the ankle-joint. The cartilage has been removed from the articular surface of the tibia, and is replaced by a layer of vascular false membrane.

Hunterian.

763. Parts of a tarsus and metatarsus. The navicular and one of the cuneiform bones, deprived of their articular cartilages, and dead, lie loose in a cavity, the interior of which is covered with very vascular granulations. A large portion of the navicular bone has been removed by ulceration. Another of the cuneiform bones has also separated after necrosis, and lies loose in a cavity near the sole.

Hunterian.

764. An internal cuneiform bone, and the proximal half of the metatarsal bone of a great toe. A portion of the cuneiform bone, incompletely detached after necrosis, lies in an ulcerated cavity, formed partly by the cuneiform bone, and partly by the adjacent portion of the metatarsal bone.

The corresponding parts of both bones are irregularly enlarged, and their articular surfaces are ulcerated.

The patient was a man twenty-five years old. The bones preserved were removed by operation; but secondary hemorrhage ensued, and was followed by sloughing of the integuments, hectic fever, and death.

From the Museum of Robert Liston, Esq.

Other specimens of Necrosis of the Bones of the Tarsus:—

Nos. 669 to 672, 3210 to 3213.

765. The bones of a great toe, with the metatarsal and internal cuneiform bones, amputated from a young person. There has been necrosis of the metatarsal bone, portions of which are removed, and others remain loose and detached. Its articular surfaces are both destroyed. The corresponding surfaces of the first phalanx and the internal cuneiform bone are very deeply ulcerated, and small quantities of new bone have been formed on their remains.

From the Museum of Robert Liston, Esq.

766. The bones of a great toe, with its metatarsal bone. On the inner and inferior aspect of the latter, near its proximal extremity, is a deep irregular ulcerated cavity, at the bottom of which cancellous tissue, apparently healthy, is exposed. Portions of the metatarsal bone are partially separated after necrosis. The shaft is enlarged, and covered with new bone. There is a small exostosis on the outer margin of the distal extremity of the last phalanx.

Amputated from a woman thirty years old.

From the Museum of Robert Liston, Esq.

767. Part of a great toe, in which several small portions of bone have been exfoliated from the distal extremity of the metatarsal bone. The bone adjacent to the dead pieces has been painted red. *Hunterian.*

768. The bones of a great toe, with the distal end of the metatarsal bone.

After necrosis of a part of the first phalanx, only its articular ends, and the immediately adjacent parts of the shaft, remain. In the interior of the proximal portion is a small sequestrum of cancellous tissue. The articular surface of this portion is healthy; but that of the distal portion, and the corresponding surface of the second phalanx, are superficially ulcerated.

From the Museum of Robert Liston, Esq.

769. The bones of a great toe. There has been necrosis of a portion of the cancellous tissue of the first phalanx, and the dead piece remains fixed at its proximal extremity, in an incomplete cavity formed by the inferior wall of the bone. The cavity has an aperture of communication with the metacarpal articulation, and is wide open above, from the destruction of nearly all the dorsal wall and distal extremity of the bone. The proximal end and articular surface of the last phalanx are destroyed. No new bone has been formed.

From the Museum of Robert Liston, Esq.

770. The bones of a great toe, with the metatarsal bone. There has been necrosis (or, perhaps, only ulceration) of the metatarsal bone, and a large portion of its wall has been destroyed. A small portion of the bone lies nearly loose in a cavity with external openings, within which the greater part of the cancellous tissue of the shaft remains perfect. The surface of the remains of the shaft is covered with new bone. The articular surfaces and the other phalanges are healthy.

Amputated from a girl seventeen years old, in whom the disease had existed three months. Its origin was ascribed to a bruise.

From the Museum of Robert Liston, Esq.

771. The bones of a great toe, with the metatarsal bone. The first phalanx, and the metatarsal bone, are so ankylosed that they appear to form a continuous shaft, expanded at its middle. At their junction is a large cavity, with three wide external openings through the wall of the bones,

in which a portion of the cancellous tissue, separated after necrosis, lies loose. The adjacent parts of the shafts are healthy, and no new bone has been formed.

The disease had existed twenty-four years; and several portions of bone had been discharged. The diseased bones were first removed by dividing with cutting forceps the metatarsal bone near its proximal end. This end was several days afterwards removed, in order to secure the anterior tibial artery, from which repeated hemorrhages had occurred.

There is a drawing of the preparation in Mr. Liston's "Practical Surgery," p. 377. Ed. 1846.

From the Museum of Robert Liston, Esq.

These specimens, together with Nos. 615-6, 619 to 622, 731 to 737, 772 to 775, and 784 to 792, form a full series of illustrations of the morbid anatomy of the bones of the fingers and toes.

A comparison of these with many of the specimens between Nos. 612 and 622, will show how difficult it sometimes is to distinguish between necrosis and ulceration; that is, between those specimens in which the death of a portion of bone has been the consequence of ulceration spreading round it, and detaching it, and those in which the ulceration around a portion of bone, and its detachment, have been consequences of its death.

Other specimens of Necrosis of the Bones of the Metatarsus and Toes:—

Nos. 647 to 653, 677.

SERIES XII.—Sub-Series 6.—TUMOURS OF BONES.*

THE specimens in this Sub-Series are arranged and named according to the plan and nomenclature of the Sixth Series, detailed in Vol. I., pp. 62 and 80.

1. *Cartilaginous Tumours: Enchondroma, Müller.*

772. A finger, with a tumour growing from the palmar surface of its first phalanx.

The tumour is nearly globular, about an inch and a half in diameter, and

* The specimens of Tumours of Bones in other parts of the Museum are referred to at the end of this Sub-Series.

composed of pale, firm, semi-transparent, and slightly vascular cartilage, like that of the fœtal skeleton, arranged in nodules, with partitions of cellular tissue. It appears to be connected with only the periosteum of the phalanx. In its growth the tumour has pushed aside the flexor tendons and their sheath.

From the Museum of Robert Liston, Esq.

773. The bones of a little toe, with a tumour on the inferior surface of the first phalanx. The tumour, closely resembling the last described, is nearly globular, and about an inch and a half in diameter. It consists of firm, grey, cartilaginous substance intersected with tough, shining, fibrous bands, and is invested with a thin capsule of cellular tissue.

Removed from a young man, in whom the tumour had been growing for three years.

From the Museum of Robert Liston, Esq.

774. A section of the finger of a child, with tumours of the first and second phalanges. The original tissue of the second phalanx is nearly destroyed by the growth of a cartilaginous tumour within and around it. This tumour is nearly globular in form, an inch in diameter, and smooth on its surface, which has a thin but complete covering of cellular tissue. Its texture is firm, pale, transparent, and glistening; and it is composed of numerous round portions, connected by fibrous tissue. The growths within and around the bone are continuous. A growth of the same nature, but not connected with the preceding, fills the distal extremity of the second phalanx. It has destroyed all the original cancellous tissue, and has just made its way through the dorsal wall of the bone.

Hunterian.

775. Fingers, with the heads of the metacarpal bones, in which are several cartilaginous tumours. Two or three of these tumours are connected with the ends of the metacarpal bones: there are two on the phalanges of the fore finger, two on those of the second finger, three or four on the third, and one is contained within the first phalanx of the little finger.

All the tumours are globular, or approach that form; they are from one half of an inch to one inch and a half in diameter, nearly smooth on their surfaces, and each is covered with a thin layer of cellular tissue. A section of one on the fore finger shows that it is composed of cartilage, like that in the preceding specimens, but more vascular. The section of the little finger displays a similar tumour in the medullary tissue of its first phalanx and the commenced expansion of the surrounding wall; and it is most probable that some of the tumours which exhibit a more distinct swelling than this presents originated in the same manner within the phalanges, and in growing have either expanded or burst through their walls.

The hand was amputated from a girl thirteen years and a half old. The tumours had been growing eleven years. She died of consumption.

From the Museum of Sir A. P. Cooper.

776. A vertical section of the upper half of a tibia, with a large tumour at its posterior part. The tumour in its chief diameters measures about six and four inches; it is of an irregularly rounded form, with a deeply nodulated surface, and is invested with a thin fibro-cellular capsule. The cut surface shows it to be composed of round and irregular masses of firm semi-transparent bluish-white substance, like fœtal cartilage, variously grouped, and connected and intersected by strong fibrous bands. Within these bands are numerous blood-vessels, into which portions of bristles are introduced. The upper part of the tumour, as well as several small portions of its interior, are osseous. In the former, the osseous tissue is compact, looks granular, and is continuous with the cancellous tissue of the head of the tibia, which is, also, more than usually compact. At this part, the wall of the bone, for about two inches below its upper margin, is deficient, being gradually lost in the ossified portion of the tumour; and an inch lower down its outline is indistinct, having partially coalesced with another portion of bone formed in the adjacent part of the tumour. The rest of the tibia, and its articular surface, are healthy.

From the Museum of Joshua Brookes, Esq.

777. A small portion of the exterior of the tumour last described, showing more

clearly its composition of small masses, or nodules, of cartilage, in some of which bone of delicately cancellous texture has been developed.

778. A similar preparation.

779. A vertical section of a humerus, and of a great tumour formed around the superior three-fourths of its shaft. The tumour is very like that in the preceding preparation, but much larger. It has an irregularly oval form, measures nearly ten inches in its greatest diameter, and is deeply lobed and nodulated on its surface. It is chiefly composed of round portions of pale semi-transparent cartilage; in some, especially the lower, parts of its interior there are irregular cavities, whose walls are formed of softened cartilage, looking like pale jelly; in many other parts, cancellous osseous tissue has been formed. The tumour is in every part closely connected with the posterior and lateral walls of the humerus. At the upper part, where the tumour appears to have originated, the posterior wall of the humerus is destroyed, and there is complete and extensive continuity between its cancellous tissue and the osseous tissue of which the tumour is in this situation chiefly composed. Lower down, the exterior of the wall of the humerus is obscure, having coalesced with the tissue of the tumour, but its internal surface is nearly perfect; and still lower the wall is uneven and vascular externally, but has not coalesced with the tumour, and seems only to have suffered from the pressure upon it. The anterior wall of the humerus is entire. The ulnar nerve stretched over the front of the tumour, and the median nerve and brachial artery, which seem to be involved in its substance, are preserved. The vessels of the arm have been minutely injected, but the tumour shows scarcely any appearance of vascularity.

The patient was a surgeon in the Navy, in whom the tumour had been growing for nearly forty years. It had at last greatly impeded the motions of the joint, and produced extreme pain by its pressure upon the nerves, and upon the side of the chest.

Amputation at the shoulder-joint was performed, and the patient recovered from the operation; but died two months afterwards with disease of the chest.

The account of the operation, and an engraving of the preparation, are given in Mr. Liston's "Practical Surgery," p. 373. Ed. 1846.

From the Museum of Robert Liston, Esq.

780. A hand, with a large tumour implicating the first phalanx, and the distal half of the metacarpal bone, of the second finger. The tumour is of an elongated oval form, and measures about four inches in its greatest diameter. Its exterior is smooth, and covered by the expanded tendons and fibrous sheath of the finger. A section through its whole length and thickness shows that its exterior is composed of a pale, firm, and nearly homogeneous substance, but that internally it is much softer, and its tissue has broken up, so as to leave an irregular cavity, which contained a soft substance, and particles of bone. It is probably a cartilaginous tumour, softened. The second and third phalanges of the same finger are thrust inwards by the tumour, so that they project from its inner side; but both they and the rest of the hand appear healthy.

The patient recovered after amputation.

From the Museum of Robert Liston, Esq.

781. A large tumour (probably a cartilaginous tumour, softened), originating in the acromion process, and spine of the scapula, which, with the integuments and muscles over it, was removed by operation. The tumour, nearly hemispherical in form, and about six inches in diameter, is composed of numerous small round masses of a pale, semi-transparent substance, like cartilage, held together by thick layers and bands of fibrous tissue. In its interior are several irregularly shaped cavities, which were filled with a glairy fluid. Its mode of connection with the bone cannot now be discerned. The loose pieces at the bottom of the bottle are portions of the tumour and of the scapula.

The tumour was believed to have originated in several severe blows upon the shoulder. The patient died, three years after the operation, with a return of the disease.

From the Museum of Robert Liston, Esq.

2. *Cartilaginous Tumours Ossified. Osseous Exostosis.*

a. *The Osseous Tissue chiefly Cancellous and containing Medulla.*

782. A little finger, with a small globular tumour which has grown from the palmar surface of the distal end of the first phalanx. The tumour is chiefly composed of bone, arranged in a close cancellous tissue, and is invested with a thick fibro-cellular capsule.

From the Museum of Robert Liston, Esq.

783. A fibula, on the upper and inner part of which is a large osseous tumour. The tumour measures about four inches in each diameter, has an uneven deeply lobed surface, and is composed of a light spongy osseous tissue, filled with medulla, and in most situations covered with a thin layer of more compact bone. It appears to have grown from the interior of the fibula, the inner wall of which is expanded, and extends outwards at the part where it is continuous with the surface of the tumour. The upper part of the shaft of the fibula is curved outwards by the pressure of the tumour, but its head and articular surface are unaltered.

Presented by Sir William Blizard.

784. The first phalanx of a finger, with two large irregular osseous tumours, one of which has grown from each side of it. Like that in the preceding preparation, they are composed of cancellous tissue, containing abundant medulla, and, for the most part, thinly covered with compact bone. They are uniformly united with the shaft of the phalanx, their walls being smoothly continuous.

Hunterian.

785. The metacarpal bone and phalanges of a little finger. A globular osseous tumour, about an inch in diameter, has grown from the interior of the distal extremity of the metacarpal bone. It is composed of light cancellous tissue, invested with an incomplete covering of more compact tissue, and projects on the ulnar edge of the hand. Its outer wall is smoothly

continuous with that of the adjacent healthy portion of the shaft. The inner side of the wall of the proximal end of the first phalanx is very thin, and perforated by many small apertures: perhaps a cartilaginous tumour was growing in it.

From a woman twenty-two years old. The disease did not return after the amputation of the finger.

From the Museum of Robert Liston, Esq.

786. The bones of a fore finger. On the outer side of the shaft of the first phalanx is a tumour, like that in the preceding preparation, with a broad oval base, and a flat outer surface, covered with a thin layer of compact bone, and cancellous within. The tumour extends over the whole length of the phalanx, and their walls are smoothly continuous.

From a man twenty-three years old, in whom the disease had existed many years. Before the amputation, portions of the tumour had often been cut off: hence the flatness of its outer surface.

From the Museum of Robert Liston, Esq.

787. The end of a great toe, with an osseous tumour, arising from the inner side of the extremity of the last phalanx, and displacing the nail. The surface of the tumour is covered only by a thin layer of integument.

788. The last phalanx of a great toe, on the inner side of the extremity of which is a small tumour, composed of loose spongy bone, of a rounded form, with a narrow base of attachment: the adjacent part of the phalanx appears to have been more vascular than is natural.

From a man twenty-two years old.

789. Sections of the last phalanx of a great toe, and of a similar osseous tumour arising from its extremity. The tumour is composed of finely cancellous osseous tissue, invested by a thin layer of compact tissue, which are respectively continuous with the wall, and with a part of the cancellous tissue, of the phalanx.

790. The last phalanx of a great toe, with a small osseous tumour growing from the inner side of its extremity. The tumour has a broad base of attachment, and its outer surface is flat, rough, and formed by cancellous bone. Upon this surface there was probably, previous to maceration, a layer of unossified cartilage.

791. The last phalanx of one of the little toes, with a round smooth osseous tumour grown from the upper surface of its extremity. The tumour is as large as the phalanx itself, and constricted at its middle.

*The five preceding preparations are from the
Museum of Robert Liston, Esq.*

The foregoing preparations are those referred to by Mr. Liston in the paper in which he first described this form of exostosis, "On the cure of exostosis of the last phalanges of the toes by excision of the diseased bone," in the *Edinburgh Medical and Surgical Journal*, vol. xxvi. p. 27, 1826. Nos. 410, 411, and 413, are there engraved.

792. The last phalanx of a great toe, with a small flat osseous tumour, attached by a narrow base to the middle of its dorsal surface near the distal extremity.

From the Museum of R. B. Walker, Esq.

b. The Bone chiefly compact and hard. Ivory Exostosis.

793. A portion of the upper part of a frontal bone, on the anterior surface of which, near the middle, are two small lens-shaped osseous tumours. Their surfaces are dense, polished, and as hard as ivory. Their margins are sharp, and project over their bases. *Hunterian.*

794. Parts of a frontal and of a parietal bone, on the inner surface of which are several osseous growths. These growths are fixed on the inner table of the skull by broad bases; their exposed surfaces are irregularly nodulated, and they appear to be composed of hard osseous tissue. The dura mater is extended over them, and attenuated; in some parts, an attempt has been made to reflect it from them, but it appears to have been too firmly adherent; in other parts, recent lymph is deposited upon the inner

surface of the dura mater. The largest of the osseous growths is beneath the coronal suture; it has an irregularly oval form, measuring about two inches in length, one inch in breadth, and at the most one-third of an inch in thickness: the other growths are much smaller in all their dimensions. The texture of the bones of the skull appears natural, but in the temporal region there is a considerable increase of thickness, by development of the diploe; their external surface is healthy. A trephine has been applied at the part around which the chief deposit of lymph on the inner surface of the dura mater has taken place. *Hunterian.*

795. Portion of a skull, with an osseous tumour. The tumour is of an irregularly rounded form, is deeply lobed and nodulated on its surface, and measures about two inches and a half in its greatest diameter. It has for the most part the hardness and apparent structure of ivory, but in its central and posterior part is composed of very close cancellous tissue. It fills the frontal sinuses and the upper part of the left orbit, encroaches into the right orbit, and projects for nearly an inch on both the outer and the inner surfaces of the skull. It appears to have originated in the ethmoidal cells, or frontal sinuses, and in its growth to have displaced and destroyed by pressure the adjacent parts of the outer and inner tables of the skull and the inner wall of the orbit. On the anterior aspect two of its lobes have made their way through separate apertures in the outer table: the margins of these apertures are thin, and extended for a short distance over its surface. Just above the tumour, near the left temporal ridge of the frontal bone, is a small round flattened elevation of bone. *Hunterian.*

This preparation is engraved in Baillie's *Morbid Anatomy*, Fasc. x., pl. 1, fig. 2. See also Home, in the *Philosophical Transactions*, vol. 89, 1799, p. 239.

796. Sections of two vertebræ of a cod-fish (*Gadus Morrhua*) with a nearly spherical growth of compact hard bone, half an inch in diameter, attached to their adjacent borders and surfaces. The surface of the tumour is lobed, but not deeply, and appears less compact than its interior.

From the Museum of George Langstaff, Esq.

c. Osseous Growths of various and uncertain nature, but resembling in some degree the Osseous Exostosis.

797. Several ribs of a chameleon, each with one or more small oval tumours. These tumours were said to be the results of the union of fractures, but their number, even on the same rib, and their regularity of form, render that account very improbable. They have rather the appearance of circumscribed enlargements of the ribs; their exterior is compact and continuous with the outer wall of the rib; their interior is filled with cancellous tissue. *Hunterian.*

798. A radius and ulna, without their epiphyses. They are of very light, brittle texture, atrophied and curved, probably by rickets. On the inner margin of the lower end of the radius is a spinous, cylindriform growth of bone, with a broad expanding base, cancellous in its interior, but externally, except at its extremity, covered with a thin layer of compact bone continuous with the wall of the shaft. The middle of the outer margin of the ulna is prolonged in a thin broad ridge, the free border of which is unequally thickened, and rests in a deep pit in the side of the radius. There is also a small pointed growth, like that on the radius, just beneath the coronoid process of the ulna.

The humerus of the same arm, with several similar ridges and projections, is preserved in No. 3230.

Hunterian.

799. Sections of the upper part of a tibia, similarly diseased, and showing that the projections from its walls, like broad-based and ridged or pointed osseous tumours, are chiefly formed by the increase of healthy cancellous tissue and the extension of the walls. The walls of the shaft are very thin, and its texture is light and greasy.

The femur and humerus of the same person, similarly diseased, are preserved in Nos. 3231-2.

From the Museum of John Howship, Esq.

800. Sections of part of a femur, having on the middle of the anterior part of its shaft a growth of bone about five inches long and an inch wide, convex on its anterior surface, attached by a broad base which is continuous with the surface of the shaft above and on its outer side; but on its inner side, and below, projecting over the shaft with a sharp thin margin, and a long pointed process. The sections of this growth show that it is composed of cancellous tissue, with an abundant medulla, covered in by a layer of compact tissue, half a line in thickness, and continuous with the outer layers of the wall of the femur. At the margin of the growth, above and below, the wall of the femur appears to divide into two layers, of which the outermost is continued (as already said) over the surface of the growth; just as if a quantity of cancellous tissue had been gradually formed in the middle of the wall, separating it into two layers, and elevating the outer one. The inner or deeper layer of the wall preserves its straight course, and separates the cancellous tissue of the morbid growth from that of the medullary tube of the shaft.

Hunterian.

3. *Fibrous Tumours.*

801. A vertical section of the knee-joint of a large dog. A large tumour composed of tough compact white fibrous tissue has formed in the popliteal space, and is intimately connected with the periosteum of both the femur and the tibia. Small portions of osseous substance are imbedded in its interior, but the bones with which it is connected are healthy.

Hunterian.

802. A section of the lower end of a humerus, with a large tumour on its anterior and inner part. The tumour is oval, five inches in its greatest diameter, and smooth on its surface. Its texture is nearly similar in every part, pale, and compact: it seems composed of a very dense fibrous tissue, variously intersected and imperfectly divided into lobes by curved and

undulating small shining bands, so as to look somewhat like the central parts of an intervertebral fibro-cartilage. The broad base of the tumour is closely applied on the exterior of the humerus or its periosteum, but the bone itself appears healthy. *Hunterian.*

803. A vertical antero-posterior section of the lower third of a femur, the upper part of a tibia, and of a large tumour connected with them. All the articular portion of the femur appears to have been expanded or destroyed by the growth of the tumour within it. The tumour is irregularly spheroidal in its shape, but at its lower part presents something of the form of the condyles of the femur. It measures about four inches in its chief depth, and six or seven inches in width from side to side. In texture, it closely resembles that last described, but its colour has been changed by the solution in which it has been kept. It is composed of a compact and somewhat glistening substance, traversed in many parts by short undulating white fibres. A few small oval cells, with smooth internal walls, are imbedded in its interior, and in one part it is softened, and blood appears to have been diffused through it. The end of the shaft of the femur above the tumour is abruptly and roughly broken. The tibia is healthy; and the tissues around the tumour appear to be altered only by distention. *From the Museum of Robert Liston, Esq.*

804. The upper end of a fibula, surrounded by a lobulated tumour, nearly four inches in diameter. The tissue of the tumour is for the most part pale, nearly homogeneous, and very firm; it is arranged in round masses connected by fibrous tissue, having spicula of bone mixed with it, and closely resembling in form and arrangement those of some specimens of the fibro-cellular tumour, as Nos. 209, 210, 174. The tumour grows entirely from the exterior of the bone, and has no communication with the knee-joint.

The patient, a man twenty-two years old, ascribed the disease to a severe blow, received several months previously. The tumour, with the upper part of the fibula, was removed by operation: profuse hemorrhage ensued, and the formation of a large abscess under the fascia lata proved fatal.

From the Museum of Robert Liston, Esq.

805. A finger, with a tumour on the palmar surface of the distal end of its first phalanx. The tumour is of an oval form, and composed of dense white tissue, like fibro-cartilage.

From the Museum of Robert Liston, Esq.

4. *Osteoid Tumours.*

806. A vertical section of the lower part of a femur, with a large osteoid growth around and within it.

The following account of the case is from the Hunterian Manuscript, "Cases and Dissections," No. 78:—

"Case of a tumour in the thigh-bone, which became bone, as also in the chest.

"Bony Tumour in the Thigh.

"A man came into St. George's Hospital, November, 1786, with a hard swelling of the lower part of the thigh, as it were beginning from the knee. It appeared to be a thickening of the bone, involving in it the surrounding parts, the whole appearing to make nearly one mass.

"It was then increasing very rapidly, and at this time so large as to interfere with the motion of the joint, so as to render the leg useless. The tumour was hard as bone, and seemed to be nearly equal all round the thigh.

"The man had been in perfect health in this part, till about five months before, and then began to feel shooting or darting pains in that part of the thigh, which continued for four weeks, during which time he could perceive no alteration in the parts, either to appearance or to the feel; but in the fifth week, or beginning of the second month, the part began evidently to enlarge, although at first very slowly; but in the third month it increased more rapidly, and was attended with more pain as it enlarged, so that in the fifth month it was increased very considerably; and the pain was now exhausting him much, increasing nearly in proportion to the size; and it was thought advisable to remove the whole, which was done.

"On examining the diseased part, it was found to consist of a soft substance surrounding the lower part of the thigh-bone, of the tumour kind, which seemed to originate from the bone itself, into which were shooting ossifications; and, as the tumour formed externally, the ossific matter formed in it, as it were keeping pace with it; the tumour becoming a nidus for bone, similar to a cartilage.

"Besides this external increase of bone, there was the same internally; for the canal, as well as the whole cellular texture of the bone, was filled entirely up, so that the old bone was become compact and hard in its substance.

"He went on well after the amputation for four weeks, when he began to complain of a difficulty in breathing, but not attended with the least pain. This increased for a

fortnight very much, and he then had a rigor every other day, which was supposed to be an attack of ague. From this time he began to lose his flesh and sink gradually, his breathing being more and more difficult, and in three weeks after the difficulty of breathing came on, and seven days after the rigors, he died: living only seven weeks after the operation.

“ Dissection.

“ On examining the body it was found that the same disposition to form bone, which had taken place in the thigh-bone, had also affected the thorax and its contents.

“ The cartilages of the trachea were opaque, and in some places ossified: bony tumours were found in the cellular membrane of the lungs, upon the pericardium, and some very large ones on the pleura, adhering to the ribs, and upon the anterior surface of the vertebræ of the back. [See Nos. 228-9, 230, 3238.]

“ These tumours, or diseased appearances, were in all the different states between soft parts and bones, so that they had not been originally formed into bone; but had been formed first of soft substance, which had afterwards been removed for osseous matter.

“ Besides the singularity of the disease and appearances themselves, the seeming quick progress of the disease in the chest is not less uncommon or unaccountable; for when the leg was amputated he had not the least symptom of any disease in the chest, nor for four weeks after; and in three weeks after the first symptoms he died: in which time (from the symptoms) we are to conclude these tumours grew. However, from reasoning, we may suppose that the appearances which were found after death had taken place a considerable time before the symptoms took place: yet we must allow that they could not have advanced far, and, therefore, their growth must have been very rapid, as indeed the increase of the symptoms would plainly show; and if we compare this with the increase of the thigh-bone, which was visible, we can also judge of their increase; for from the first appearance of increase, to his coming into the Hospital, was only between three and four months, and it increased more the last month than all the others.

“ One can figure to themselves a reason why the tumour which formed on the outer surface of the thigh-bone might become bony, because it might acquire that disposition from the bone it surrounded; but, from these tumours formed in the chest becoming bone, shows it was the nature of the tumours themselves.”

807. Another section, comprising about half of the same femur and tumour, macerated and dried. The tumour measures ten inches in length, and five in breadth. It completely surrounds the femur, but is most prominent posteriorly; the lower part of the posterior wall of the shaft is lost in it, and that of the anterior wall is imperfect. The central part of the tumour consists of hard bone; but it has neither the peculiar hardness nor the polish of ivory, like some of the osseous tumours

already described: rather it resembles the cut surface of chalk. The surrounding substance of the tumour is softer, and its softness increases towards its surface, where it presents (what is more obscurely seen in the deeper parts) a fibrous and fasciculated appearance, due to very thin plates of bone, so arranged that their edges or sections look like fibres in close bundles radiating outwards. At the surface, also, the tumour is very soft and friable: a piece of it may be easily rubbed into such fine dust as lies at the bottom of the bottle, like powdered chalk or pumice-stone. A canal, nearly half an inch wide, which probably enclosed the sciatic nerve, traverses the whole length of the tumour from above downwards, passing through its central hardest part; and by its side is part of another smaller canal, through which, probably, the popliteal vessels ran; for on the exterior of the tumour there is not any appearance of a groove in which they could have lain. *Hunterian.*

808. Section of one of the condyles of the same femur, with part of its articular cartilage. Nearly the whole of its medullary substance is replaced by solid hard bone, like that in No. 806. The articular cartilage is healthy and retains its natural form; but is not firmly connected with the diseased bone. *Hunterian.*

809. A portion of the same tumour, after the removal of the earthy matter, by maceration in acid. The remaining animal basis of the tumour consists of a very dense, pale, semi-transparent fibrous substance. On its surface the fibres are very fine, their extremities are free and separate, and have the same arrangement as the bony fibres in No. 807, so that they present a brush-like appearance; more internally the tissue is very compact, and its fibres have no uniform plan of arrangement. *Hunterian.*

810. Section of the right parietal and temporal bones of a young woman, with a tumour on each of their surfaces. The tumour on the outer surface was nearly circular and lens-shaped, measuring about an inch and

a half in diameter, and half an inch in its greatest depth. It is composed of bone and some firm tissue, the section of which has a pale and nearly uniform fibrous, glistening aspect. The bone is arranged in fine fibres, which are set vertically upon the surface of the skull, and are covered with a thin smooth layer of the other substance. The tumour on the interior of the bones is of the same form and nature, but the layer of unossified substance on its surface is thinner, and it is somewhat smaller. The lines of boundary between these tumours and the surfaces of the bones are distinct, and the bones themselves are healthy, though, when recent, they were unnaturally vascular. *Hunterian.*

811. The other section of the same bones and tumours, after maceration, showing that the osseous portion of the latter is chiefly composed of very fine close-set vertical fibrils, like those of an osteoid tumour. The external tumour has been separated from the skull, but the internal one adheres, and small patches of osseous fibres, set vertically upon the skull, around the chief mass, show that the whole tumour was composed of several smaller portions.

The following history of the case is published by Sir Everard Home, from the *Hunterian MS.*; and there is a drawing of the preparation, in "Cases and Observations, which show that Inflammation is sometimes communicated from the Dura Mater to the Pericranium," in the "Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge." Vol. iii., p. 153. London, 1812.

"A woman, twenty-five years of age, in May, 1806, was seized with a pain in her stomach, and a confined state of her bowels. These symptoms were relieved by proper medicines, and she returned to her employment, as a housemaid, in a fortnight. In the course of a month the same symptoms returned, conjoined with a pain in her back and feet, but more particularly in the latter. The symptoms became worse, and a paralysis of the bladder took place. She had no stools but from glysters, as medicines given by the mouth had no effect on her bowels.

"The only cause to which these complaints could be referred, was a tumour on the right parietal bone, which had appeared when she was first attacked, and had increased ever since.

"After suffering severely for three weeks, principally from the pains in her feet, she died.

"On examining the body no unusual appearance could be discovered in any part except the skull. The tumour projected about half an inch above the bone, on the outside, and there was a similar tumour placed exactly opposite on the inside of the

skull, projecting the same distance inwards, and pressing on the middle lobe of the cerebrum. These tumours were of a fibrous, bony structure; they were simply in contact with the cranium, having no adhesion to it, and the cranium was sound between them, only unusually vascular."

812. Portion of the right side of a frontal bone, with a tumour, like that last described, growing from its outer surface. The tumour, through which a vertical section has been made, was oval in its outline, and evenly convex upon its surface. It measured an inch and a half in its chief diameter, and rather more than half an inch in depth. Its deeper and principal portion is composed of small plates and fibres of bone set vertically, and somewhat radiating, upon the surface of the skull; the rest is composed of a tough pale substance, like fibrous tissue, which covers all its surface, and dips down and fills all the spaces between the plates and fibres of the osseous substance. The base of the tumour is entirely osseous, and very dense; the skull beneath it also appears increased in density, and the diploe is consolidated. On the corresponding part of the internal surface of the skull there are projecting points and fibres of bone, but no regularly formed tumour. To the surface of this part a portion of dura mater is adherent, together with a small portion of the right hemisphere of the brain, the whole of which is said to have been "converted into a fibro-granular structure." Another portion of brain, similarly altered, lies loose in the bottle. It looks like a mass of fine blood-vessels and filamentous tissue, such as might be produced by complete removal of the nervous substance of the brain.

From the Museum of R. B. Walker, Esq.

813. The other section of the same frontal bone, macerated. The laminated and radiating fibrous arrangement of the osseous part of the tumour, the hardness of its base and of the subjacent bone, and the roughness of the corresponding internal surface of the skull, are well shown. It is here also seen that a similar roughness extends over much of the adjacent bone, and over the lower surface of the orbital plate, which are covered with points and spicula of bone, deposited on them like a hoar-frost.

The patient was a gentleman forty-five years old. Twelve months before his death

his sight became bad, and in three months he was amaurotic in both eyes. Two months after this the tumour on the skull first appeared, and it gradually increased till he died comatose. No organic disease was found in the eyes.

From the Museum of R. B. Walker, Esq.

814. Vertical sections of an ulna and radius, and of the lower part of a humerus. The upper half of the ulna is surrounded by a tumour of elongated oval form, composed of dense fibrous and osseous substance. The osseous portion of the tumour is arranged in long fibres and lamellæ, which appear to radiate from the exterior of the ulna, and between which the interspaces are filled with the fibrous tissue. The outer surface of the tumour is nearly smooth, and is covered with a dense fibrous tissue, like a periosteum. The outline of the wall of the ulna is for the most part distinct, though the tumour is closely connected with it; but at its upper and anterior parts, the tissue of the shaft seems to have coalesced with that of the tumour, and the boundary-line between them is obscure. The cancellous tissue of the ulna at the same part is compact and dense, as if occupied by a substance similar to that of the hardest part of the tumour. The radius and humerus are healthy; and the articular surface of the ulna, as well as the rest of the elbow-joint, is unaffected by the disease.

The patient was a man twenty-four years old, in whom the tumour had grown slowly for two years. He recovered after amputation.

From the Museum of Robert Liston, Esq.

815. A fibula, with parts of one or more large osteoid tumours, which were developed upon the upper half of its shaft. The parts having been macerated, all that remains of the tumour consists of masses of light and friable grey sponge-like bone, arranged in filaments and delicate lamellæ, which, for the most part, radiate or are set vertically upon the shaft, and which, though much less dense, closely resemble, in both arrangement and general appearance, those in No. 807. The largest of these masses is in the form of a circular disk, about six inches in diameter, which was attached to the outer side of the fibula; the other smaller masses were fixed around it, and completely enclosed it. The shaft of the fibula is entire, but its upper part is covered with fine osseous lamellæ, from

which the masses of bone have been detached; on its lower part is a layer of new bone.

Presented by Sir William Blizard.

816. Portions of bone, from a large, probably osteoid, tumour, connected with the right os innominatum.

From the patient whose case is described as "An Account of an Ossification of the Thoracic Duct, by Richard Browne Cheston," in the Philosophical Transactions, 1780. Vol. lxx., pp. 323 and 578.

5. *Scirrhus or Hard Cancer of Bones.*

817. A portion of the condyles of a femur. The osseous tissue has been completely removed, and, without any change of form, its place is occupied by a very firm, elastic, pale brownish substance, traversed by white fibres, the arrangement of which bears a resemblance to that of the original cancelli. The articular cartilage is thin, and its external surface is irregular; its inner surface is detached from the morbid substance, and is smooth and healthy.

The patient was a lady of middle age from whom a carcinomatous breast was removed in April, 1794. She remained apparently well for a year, when another tumour appeared in the situation of the cicatrix. This, with all the parts for a considerable distance around it, was removed in the beginning of 1796, and there was no return of the disease till 1803, when the cicatrix became again the seat of cancerous disease. No further operation was performed, and in 1805 the patient was attacked by violent pain and swelling in the left knee. As soon as this occurred the disease of the breast became painless, and ceased to make progress. The new affection was supposed to be rheumatism, and was treated accordingly, with some disadvantage; but at length the swelling and pain subsided, and at the same time the patient became subject to extreme pain in the back and pelvis, with which she died exhausted.

After death the cancerous disease of the breast was found closely fixed to the ribs, but not involving them. The left knee-joint contained a large quantity of fluid. The articular cartilages were all thin, and of the semi-lunar cartilages scarcely a trace could be found. There was cancerous disease of the left ovary, and of the lumbar glands of the same side.*

Presented by William Long, Esq.

* From a paper by Mr. Long, in the "Minutes of the Board of Curators," July 8th, 1807.

818. A vertical section of the head and upper part of a femur, nearly all the medullary tissue of which is filled with a compact yellow and grey semi-transparent cancerous substance, with an appearance of short white fibres traversing it, and altogether very closely resembling the common hard cancer of the female breast. The form of the bone is scarcely altered; its walls are very thin; the shaft was broken an inch below the trochanter minor, and is reunited by a tough ligamentous substance, with much distortion.

From the Museum of John Howship, Esq.

819. Section of the upper part of a humerus, in which nearly the whole of the medullary tissue is replaced by a pale, compact, dense, and apparently slightly vascular cancerous substance. Parts of the inner layers of the walls of the bone are hollowed out and filled with the cancerous mass; but the shape of the bone is scarcely altered; and the texture of its remains, and all the tissues around it, as well as the articular cartilage, appear healthy. Just below the tubercles there is a transverse fracture of the shaft, which probably occurred shortly before death, from a slight force.

In Sir Astley Cooper's Catalogue the specimen was marked "Scirrhus of the Os Humeri, producing fracture of it, from Mr. Stolworthy, Surgeon. The breast of the same patient is preserved" [probably in No. 2791].

From the Museum of Sir A. P. Cooper.

820. The other section of the same humerus.

From the Museum of Sir A. P. Cooper.

821. Part of the sternum, with portions of some of the costal cartilages, from the same patient. Several small, round, flattened masses of cancerous substance are lying on, and imbedded in, the posterior part of the sternum and the adjacent tissues.

From the Museum of Sir A. P. Cooper.

822. A vertical section of part of a humerus, through the cancellous tissue of which cancerous matter, nearly resembling that in the preceding preparations, is diffused. The shaft was fractured twice about the junction of its upper and middle thirds. New bone has been formed around the ends

of the fragments, but no union has taken place. The walls of the upper portion are thin and irregular; those of the lower portion are nearly natural. *From the Museum of Robert Liston, Esq.*

823. The other section of the same humerus, partially macerated and dried. Its osseous tissue, especially in the upper portion of the shaft, has a peculiar chalk-like aspect; and in some parts, the walls and the cancellous tissue have a nearly similar finely porous texture.

From a woman who had malignant disease of the breast and uterus, and a malignant tumour in the neck.

From the Museum of Robert Liston, Esq.

6. Medullary Cancer of Bones.*

824. A finger, amputated at the carpal joint. The first phalanx is destroyed by the growth of a soft, pale, yellowish white, brain-like tumour within it.

From the Museum of Robert Liston, Esq.

825. "Part of the os frontis of a man who died at St. George's Hospital. He had several hard risings on his head, which appeared to be bony, and were by the physician and surgeons supposed to be venereal; but from the history of the case itself there was no reason for supposing it venereal. The man died of consumption, and upon examining those swellings they appeared to be a scrofulous increase of the periosteum only."—*Hunterian MS. Catalogue.*

For the sense in which Mr. Hunter used the term "scrofulous" in speaking of this, as well as the following and some other morbid growths, see Vol. i., p. 119.

* In the present state of some of the following specimens it is impossible to say to which of the varieties of the Medullary Cancer they should be referred; the following list indicates what is most probable concerning them:—

Firm Variety, 835-6-7-7A.

Spongy or Pulpy Variety, 825 to 834, 838-9, 842 to 845.

Brain-like Variety, 834.

Cystic Variety, 846 to 850.

Bloody Variety, 840-1?

Melanotic Variety, 851-2.

826. "A portion of the skull of a Frenchman, who died scrofulous."—*Hunterian MS. Catalogue.*

A vertical section of a frontal bone, with a tumour projecting on both its surfaces. The tumour, which is situated immediately over the falx, was nearly lens-shaped, and about three inches in diameter. Like that in the preceding preparation, it is composed of a soft, spongy, and obscurely fibrous substance, and is slightly lobulated. The tissue of the bone, upon which it rests, is broken and destroyed, so that the boundaries of the section of the skull can hardly be discerned; but the tumour itself contains no bone. The dura mater is closely connected with the tumour, and on its cerebral surface are several small flat masses of a similar substance. In the other edge of the section of the skull, also, is part of another tumour of the same kind, which has formed within the bone, and has nearly destroyed its tissue.

827. Section of a rib, from the same man, with a similar tumour formed within and around it.
828. Section of another rib, with a similar but larger tumour, from the same man. The substance of both the ribs is broken up like that of the skull.
829. Portion of an ilium, probably from the same man, the interior of which is nearly filled with a substance similar to that composing the tumours already described. Its walls are somewhat expanded.
830. Part of a sternum, of which the upper portion is enlarged by its interior being completely filled with a soft, brownish, spongy substance, around which the walls are expanded.
831. Another part of the same sternum, similarly diseased. Both these preparations were probably taken from the same patient as the tumours of the skull and ribs.

832. A vertebra, probably from the same patient, of which a small portion of the anterior part of the body is ulcerated, and the interior is filled with a substance similar to that composing the tumour of the skull.

The seven preceding Specimens are Hunterian.

833. Section of a parietal bone, with a tumour, very similar to that in No. 825, projecting from its inner surface. The base of the tumour is connected with the whole thickness of the bone, the original tissue of which is nearly destroyed; but it seems to have originated in the diploe, with which it is more widely connected than with either table. It is of an oval flattened form, obscurely fibrous and granular, and projects only on the inner surface of the skull. The dura mater is closely adherent to it, and thickly set with ochre-yellow tubercles of substance similar to that of the tumour. The scalp and pericranium are healthy.

Hunterian.

834. The other section of the same parietal bone and tumour. *Hunterian.*

835. A longitudinal section of a clavicle, with a large tumour formed on it. The whole clavicle, with the exception of three quarters of an inch at its sternal end, was removed by operation with the tumour and a large piece of the integuments over it. The tumour is of an oval form, and covers the whole of the upper and back part of the bone. It is composed of a moderately firm, pale, and obscurely fibrous substance, arranged in large lobes. The greater part of its base, which is firmer than the rest, is intimately connected with the periosteum; but at the posterior part, the bone itself is involved, and its outer substance is broken up and confused with osseous spicula, contained in the base of the tumour.

The patient was a young farmer, of strong constitution, in whom the disease had existed for fifteen months, and was attributed to a bruise on the clavicle. In less than four months after the operation (which is described in Mr. Liston's "Practical Surgery," p. 347, Ed. 1846) the disease returned in the form of tumours in the neigh-

bourhood of the cicatrix. One of these sloughed and produced a fungus, which bled most profusely, and the patient died after repeated hemorrhages.

From the Museum of Robert Liston, Esq.

836. A vertical section of the lower half of a femur, and of a tumour connected with it. The tumour is situated on the exterior of the femur, and extends from the upper margin of the epiphyses about five inches up the inner side of the shaft. Its surface is superficially lobed, and is covered with a tough membrane, which appears to be continuous with the periosteum. It is composed in part of a greyish substance, nearly as firm as cartilage, and in greater part of a softer whitish substance; there are also some irregular cavities in it. In the corresponding part of the interior of the femur, the cancellous tissue is filled with dense granular substance, which, when recent, was of a light brown colour. The upper limit of this change of structure is clearly marked, and is nearly opposite the upper margin of the tumour. The inner wall of the femur, on which the tumour rests, is sound, except at about the middle of the tumour, and at the lowest part, where, for a short distance, its clear outline is lost. In both these situations the morbid growths within and without the bone are continuous. All the rest of the bone is healthy.

From a lad nineteen years old, in whom the tumour had been observed for nearly two years. He had no pain, but was in a state of great debility, and died after amputation.

From the Museum of Robert Liston, Esq.

837. The upper half of a femur, with the border of the acetabulum, and a tumour about eight inches in diameter. This tumour has been developed around and within the upper fourth of the femur, involving and destroying both the shaft and the neck of the bone, and extending so as to embrace the acetabulum. Sections show that it is composed of lobular portions of a firm, obscurely fibrous substance, mixed with particles of bone. The head and neck of the femur, through which one of the sections has been carried, are filled with the same material. The articular cartilage is

uninjured, but the wall of the neck of the femur is destroyed, and at the lower part of the tumour its shaft is broken. The small portion of the os innominatum, which is preserved, is sound.

From a girl twenty years old.

From the Museum of Robert Liston, Esq.

837A. Part of a femur, of which the neck and nearly four inches of the shaft are enclosed in a large irregularly oval tumour, superficially knobbed and nodulated. The outer surface of the tumour appears to have been loosely attached to the adjacent tissues; its interior is fixed close to the femur, or its periosteum. In substance it is pale, firm, obscurely fibrous, and bears much resemblance to the tumour last described. The portion of the femur enclosed by it appears in part absorbed; what remains was fractured by a slight force, and is dispersed in fragments through the morbid growth. Near the lower boundary of the principal tumour, flattened and lobed masses, apparently of similar substance, are attached to the shaft of the femur, between the bone and periosteum.

The patient, a man forty-eight years old, had lived freely, and had been dyspeptic.

"From the commencement of June, 1845, he complained of rheumatism. On the 26th of that month he was out on horseback, and, in riding down a bank, his horse made a false step, but did not come down, nor was the rider unseated. From that moment he suffered the most excruciating pain in the centre and inner part of the right thigh, and became wholly disabled, so that three men could hardly lift him from his saddle. He was carried to his home—a distance of two miles—in unmitigated agony. I then visited him, and he referred his intense sufferings to the middle and inner part of the thigh. The least motion of the limb was attended with extreme pain, and with violent spasms, amounting to rigidity, of the adductor muscles. For three days and nights he could not be moved off the sofa on which he was first laid. During this time the limb exhibited no external appearance of disease. On the 29th the symptoms abated, and by the 12th of July he was able to hobble with the aid of a stick. On the latter date he unawares caught the rug with the toe of the lame foot; and this accident, though he did not fall, immediately brought on a recurrence of all the pain and severe symptoms. The violence of the second attack gradually subsided, and by the 22nd of July he was again able to hobble, and appeared to be recovering. On the 23rd he went out in a gig. On the 24th he was out for a long time, and on his return he was obliged to be lifted out of the gig. On the 29th his sufferings had become so intense that he could not be moved from his chair for the following eleven days, and could not endure any other alteration of his posture than was afforded by a

moveable back to his chair. During this period I observed, for the first time, that the upper portion of the right thigh was enlarged, as if from thickened periosteum. The swelling gradually increased, and he became so exhausted, and his ankles so swollen, that I advised his removal to bed. This was done with the greatest care: he was raised by loops and pulleys, but, notwithstanding every method for accomplishing it easily, his exclamations of pain were indescribable. When in the act of placing him in bed, a crepitus was felt in the upper part of the right thigh-bone. The limb ever afterwards lay loose and powerless, and became shortened by about two inches. On four or five occasions, subsequently, he effected his removal to the bed-side by the aid of pulleys and slides; but with those exceptions he continued in bed, not admitting of the least possible movement of the limb, until he was gradually worn out by suffering, and died, after five days' unconsciousness, on the 14th of September."

Presented, with the above history of the case, by William Irving, Esq.

838. Part of a femur, with a tumour, which has been developed within and around its shaft, about the junction of its upper and middle thirds. The tumour is about six inches in diameter, nearly globular, and its surface is irregularly knobbed. A deep incision into its inner side shows that it is composed of a soft, granular, and shreddy medullary substance, intersected by arched fibrous partitions, and containing clots of blood. It is invested by thickened periosteum. The texture of that portion of the shaft which is involved in the tumour is completely broken up and destroyed. It had been twice fractured; and the upper fragment is drawn inwards, and the lower upwards, so that their ends are wide apart.

The patient was a girl nineteen years old. She had complained for two years of pain and swelling in the thigh, when, as she was walking across a street, the bone broke at the seat of the disease. It was broken a second time, as she was turning in bed, and after this the pain and swelling rapidly increased. Amputation was performed through the trochanter minor, and the patient recovered.

There is sketch of this preparation in Mr. Liston's "Elements of Surgery," p. 187, Ed. 1840.

From the Museum of Robert Liston, Esq.

839. A tibia and fibula, with a large tumour around the upper part of the former. The tumour is of a flattened, oval form, and measures about eight inches in its greatest diameter. A section of one of its sides shows that it is composed of a soft, granular, and shreddy substance, arranged in large

lobes, with thin fibrous partitions. Blood is effused in several situations near its surface. The upper third of the shaft of the tibia is completely involved in the tumour; below it, the bone is somewhat enlarged, and its surface is deeply channelled; above it, the head and articular surface are sound. The fibula is unaffected, though pushed outwards and flattened by the pressure of the tumour.

From the Museum of Robert Liston, Esq.

840. The greater portion of a scapula, and of a large tumour, developed within and around it, which, together with part of the muscles and integuments covering them, were removed by operation.

From the Museum of Robert Liston, Esq.

The following account of the case is abstracted from Mr. Liston's "Elements of Surgery," Vol. i., p. 213, Ed. 1831, and p. 190, Ed. 1840. The first portion of the history, and a sketch of the preparation, are published in the Edinburgh Medical and Surgical Journal, Vol. xvi., p. 66.

The patient was a lad sixteen years old, who, three months before he came under Mr. Liston's care, had first perceived, just below the spine of the scapula, a small flat tumour, which pulsated distinctly. After that time it grew rapidly. When first examined it was "very large, hard, inelastic, firmly attached to the left scapula, and extending from its spine over all its lower surface. It also stretched into the axilla to within half an inch of the nervous and vascular plexus, and a large arterial trunk could be felt along its under surface." The arm was atrophied and powerless, and was the seat of excruciating lancinating pain. On attempting to move the tumour, independent of the scapula, crepitation was distinctly perceived, as if from fracture of osseous spicula. The scapula itself was moveable, the chest was unaffected, and the vessels and nerves were not implicated in the swelling. "The operation was commenced," Mr. Liston says, "by making an incision from the axilla to the lower and posterior part of the tumour. The latissimus dorsi was then cut across, at about two inches from its insertion, so as to expose the inner edge of the tumour, with a view to tie the sub-scapular artery in the first instance; in this, however, I was foiled, owing to its depth. I then proceeded to dissect, where I expected vessels to enter from the supra-scapular; and in detaching the tumour from the spine of the scapula, I felt my fingers dip into the tumour. This was attended with a profuse gush of florid blood, with coagula; by a sponge thrust into the cavity, the hemorrhage was in a great degree arrested; at the same time an attempt made to compress the subclavian failed, on account of the arm being much raised to facilitate the dissection in the axilla. The patient, exhausted, made some efforts to vomit, and dropped his head from the pillow, pale, cold, and almost lifeless. Then only I became aware of the nature of the case—nothing but a bold stroke of the knife could rescue the boy. Withdrawing the sponge, I by one

rapid incision completely separated the upper edge of the tumour, so as to expose its cavity; and, directed by the warm gush of blood, immediately secured with my finger a large vessel at the upper corner, which, with open mouth, was pouring its contents into the sac. With my right hand I then removed the coagula, and, dissecting under my finger, separated the great subscapular artery, so that an aneurism needle was passed under it at its origin from the axillary, and about an inch from the sac. After securing this and two other large vessels, which supplied the cavity, I dissected off the tumour from the ribs, without further hemorrhage, cutting the diseased scapula, and the under part of the sac. I then found it necessary to saw off the ragged and spongy part of the scapula, leaving only about a fourth part of that bone, containing the glenoid cavity, processes, and half of its spine. The edges of the wound were brought together, and the patient lifted cautiously to bed. At this time he was pale, almost insensible, and without any pulsation perceptible through the integuments in the greater arteries, though the ends of the vessels in the wounds beat very forcibly. Stimuli were employed externally and internally: in the evening his pulse at the wrist was ninety and soft."

In less than a month after the operation the wound was nearly healed, and the patient returned home in seeming good health. But in the sixth week a dark purple tumour, formed of coagulated blood, about as large as a walnut, appeared at the upper part of the wound, about an inch from the point where the subscapular artery had been tied; repeated and profuse arterial hemorrhages ensued from the opening at which this coagulum protruded, but they were checked for a time by dilating the opening, and filling the cavity beneath it with lint pressed against the remains of the scapula. Soon after, spongy and bleeding granulations began to grow from the diseased bone, and, though often repressed, were constantly reproduced. The head of the humerus was also dislocated, apparently in consequence of disease of the glenoid cavity; hectic ensued, the sore extended towards the axilla, and the patient, gradually exhausted, died five months after the operation.

"The sac of the tumour removed by the operation was composed of bony matter, arranged in strata of short fibres, pointing to the cavity. Its outer surface was smooth, and covered by a dense membrane; the inner was studded with projecting spicula. The lower part of the scapula, partially absorbed, lay in the middle of the sac, covered by the remains of its muscles, and by coagula. Very large vessels were perceived ramifying on the surface of the tumour."

The preparation exhibits, in front and at its circumference, a section of the walls of the osseous and fibrous sac, which are most distinct at its upper part. It is partially filled with a soft granulated substance, like a mixture of coagulated blood, and brain-like matter. A portion of the diseased scapula is affixed at the lower part of the sac to the right. Other portions are suspended in the lower part of the bottle. The posterior part of the larger mass exhibits the portion of the integument and the subjacent tissues, which were removed with the tumour.

841. The remains of the scapula, removed after death from the subject of the preceding case, macerated and dried.

Mr. Liston says, in his work already referred to, p. 192, "Portions of the acromion process, superior costa, and spine of the scapula were of their natural appearance. But the coracoid process, the glenoid cavity, and the cervix were entirely destroyed, and their situation occupied by an irregular broken-down tumour, consisting of osseous spicula and cancelli, irregular disposed, and forming cavities filled with blood, partly fluid and partly coagulated. The head of the humerus was extensively absorbed. The articular cartilage was almost entirely destroyed, particularly on the inner side, where a large portion of the bony matter had also been removed. The ulcerated surfaces were of a dark bloody colour."

From the Museum of Robert Liston, Esq.

842. A vertical section of a knee, with a tumour of the tibia. The anterior part of the head of the tibia is involved in the base of a large, lobulated, soft, spongy, and in some parts shreddy tumour, with many small cells, by the growth of which all its tissue seems destroyed. From this position the tumour has extended forwards, stretching the ligamentum patellæ and the adjacent parts, and upwards into the cavity of the joint, which it almost completely fills. Its surface within the joint is covered by synovial membrane; but its pressure has caused absorption of part of the cartilages of the femur and patella. A morbid substance, similar to that of which the tumour is composed, appears thinly deposited in the cancellous tissue of the adjacent part of the tibia; but the femur, the patella, and the rest of the tibia, are healthy. *Hunterian.*

843. Section of a knee-joint. The lower end of the femur is filled and surrounded with a very soft, shreddy, and granular medullary tumour, by which a great part of the osseous structure has been destroyed and removed; a small portion only of the articular end remains, covered with its cartilage. The end of the shaft of the femur, softened, ulcerated, and full of medullary matter, projects loosely into the substance which occupies the place of the destroyed bone, and is surrounded for some inches up the thigh by a continuation of the morbid growth, which, however, at this part, has a more uniform and firmer texture than it has about the chief and primary seat of the disease. The part of the cavity of the knee-joint corresponding with the remaining portion of the articular end of the femur is healthy.

Hunterian.

844. The upper parts of a tibia and fibula. By the growth of a tumour within it, the head of the tibia is enlarged, and its walls and periosteum are expanded into an osseous and membranous cyst. Through the unequal yielding, and partial destruction of the walls of the bone, this cyst is of irregular form, and projects especially at the anterior and posterior parts. In these portions its walls consist of fibrous membrane alone, and have been laid open. It is partially filled with a soft granular substance, arranged in flakes, and irregular bands and masses, the spaces between which were probably filled with fluid or coagulated blood. In its growth, the tumour has destroyed the centre of the articular surface of the tibia, through which it projects for a short distance into the knee-joint, and, also, a small portion of the inner wall of the tubercle, where is a nearly circular aperture. The fibula and the articular cartilages (except in the situation already mentioned) are sound.

Presented by Sir William Blizard.

845. Part of the parietal bone of a child, on each side of which is a lens-shaped tumour, nearly two inches in diameter, and half an inch in thickness, which has separated both the pericranium and the dura mater from the bone. The tumour is composed of a soft medullary substance, and small scattered masses of a similar substance appear to be deposited in the tissue of the bone itself.

Six months before death the child, at that time ten months old, had one of its testicles removed for medullary disease, which had been two months in progress, and protruded through the tunica albuginea. For four months after the operation the child appeared to be in good health, but at the end of that time a tumour formed beneath the scalp, and increased quickly. The general health also declined rapidly; and the abdomen became very large. After death, medullary disease was found in the lumbar glands of the right side, and in the left lung.

A further account of the case is published in "The Lancet," December 12, 1835, and in Mr. Langstaff's Catalogue, p. 372.

From the Museum of George Langstaff, Esq.

846. "A section of a tumour, formed upon [or rather in] the head of the tibia, which gave an immense size seemingly to the joint of the knee. Besides

the general volume given to the knee, there was a protuberance of the size of a large egg, which is become smooth, and of a bluish hue, from the contents shining through, which is seen in the preparation. The leg was removed, and upon examination it [the tumour] was found to have arisen on the head of the tibia. It consisted of a great many cavities, or cells, filled with bloody serum, and even coagulated blood of long standing."—*Hunterian MS. Catalogue.*

That which intervenes between the cells is a pale and soft, almost brain-like, medullary substance, in parts of which blood appears to have been diffused. The head of the tibia has been so expanded by the growth of the tumour within it, that in this section none of the bone can be discerned.

847. "Is the joint of the knee, with the head of the tibia, in which the before-mentioned tumour was formed, showing also where it is pushing into the cavity of the joint."—*Hunterian MS. Catalogue.*

The cartilage of the tibia, in the internal fossa, is elevated by the growth of the tumour beneath it.

848. Portion of a tumour, removed from the anterior and lower part of a tibia. Its exterior is formed by a smooth shell of bone; its interior is filled with a pale, soft substance, in which, especially near its circumference, are several large cells, which appear to have contained blood.

From the Museum of John Howship, Esq.

849. A vertical, antero-posterior, section of the lower two-thirds of a femur, and of the upper part of a tibia, with the adjacent parts. A great portion of the lower third of the femur appears to have been expanded by the growth of a large cystic tumour within it. The tumour is nearly spherical in its form, and measures four inches and a half in diameter. Its interior consists of large cysts, or cells, irregular in shape, with tough membranous, and in some places partially osseous, walls, which were filled with blood, and between some of which there is a pale firm substance. The growth is surrounded by a thin membranous and osseous cyst, composed of the

expanded wall and periosteum of the original shaft. There is no distinct appearance of any medullary or other morbid deposit in the tumour. Above and below, it is bounded by the shaft and condyles of the femur; in the former situation, the walls are expanded by a separation of their laminae; in the latter, the cancellous tissue appears healthy. The knee-joint, and the other surrounding parts, also, are healthy.

The following history of the case was sent with the preparation by James Luke, Esq. :—

“ The patient, John Wilham, ætat. 20, a sailor, from whom the cystic disease of the thigh was removed, was admitted into the London Hospital January 21st, 1843. Shortly after leaving Calcutta his thigh was fractured, July 18th, 1842, by a slip on the wet deck of a ship, there having been no previous suspicion of disease. By this he was confined during seven weeks, at the end of which it was found to be united. At the expiration of a month the thigh became again fractured in the same part, by a fall over a cable. After the lapse of eight weeks he was again allowed to move about on crutches; but in the middle of November, the fractured parts had become separated a second time, and had rendered confinement necessary up to the period of his admission.

“ When admitted, the fracture had united, but unevenly, and with shortening of the thigh to the extent of an inch. The fractured part was obscured by a tumour, which involved its posterior and lateral parts. The nature of this tumour was doubtful. It was generally elastic, but hard at certain parts, and fluctuated obscurely when examined. It was ascertained that it had not any pulsation. After admission the tumour increased in magnitude, and became very painful, and fluctuated more distinctly under examination.

“ January 28th.—A grooved needle was introduced into the outer part of the tumour, along the groove of which a jet of blood flowed, which quickly coagulated. On making a careful examination, a uniform pulsation was now detected over its whole surface, and the suspicion of its being aneurismal was raised. A consultation being called, the femoral artery was immediately tied. Upon drawing the ligature tight, the measurement of the tumour became diminished to the extent of an inch in its circumference.

“ February 6th.—He has gone on favourably, and to-day the ligature was removed.

“ February 25th.—During the last few days the tumour has somewhat enlarged, and fluctuation is more distinctly observable in it than before the operation. There is not any pulsation, but some pain. It was suspected that suppuration had taken place, and a grooved needle was again introduced; bloody serum only escaped by the groove.

“ March 22nd.—The tumour has increased much, is now very painful, and disturbs his rest. His health suffers greatly, and he has become very emaciated. The veins on the surface of the tumour are perceptibly enlarged, and the condyles of the femur

appear to be expanded. At this period it was thought expedient that amputation should be performed, which, after a little delay, was done on March 30th. The surface of the stump bled profusely, and upwards of forty arteries required ligature. The medullary artery was greatly enlarged, and threw out a jet of blood to some distance. From the period of the amputation the progress was satisfactory, although slow. He left the hospital in the latter part of May with the stump perfectly healed, and well in every other respect.

"The other section of the parts is in the Museum of the London Hospital. Besides appearances similar to those shown in this section, it shows the femoral artery in close contact with the tumour, but of healthy size and texture, and not giving off any large branch to the substance of the tumour."

Presented by James Luke, Esq.

850. Section of a knee-joint. The patella appears to have been the seat of a cystic medullary growth, for in its place there is an elongated oval mass of soft, brownish, medullary substance, with large cells in its lower half. The whole mass is surrounded with fibrous tissue of various thickness, containing small thin plates and fragments of bone, as if the patella and its investing tissues had been expanded around the morbid growth. The femur and tibia, and all the adjacent parts, are healthy; except that the synovial membrane is thickened where the tumour is in contact with it.

From the Museum of Sir A. P. Cooper.

851. Sections of two dorsal vertebræ, in the interior of which melanotic matter is deposited. The cancellous tissue is not apparently altered, except in its colour. A large quantity of melanotic matter is also deposited in the fibrous tissue on the front of the vertebræ.

The history of the case is with the description of No. 287, in Vol. I., p. 130.

From the Museum of George Langstaff, Esq.

852. Part of a sternum, from the same patient, with melanotic matter deposited in its interior. There are also deposits of a similar material in masses forming small tumours beneath the fibrous tissue covering the sternum.

From the Museum of George Langstaff, Esq.

7. *Alveolar or Gelatiniform Cancer of Bone.*

853. A humerus, the middle of the shaft of which is surrounded by a lobulated tumour, about four inches in its greatest diameter, and of an irregularly rounded form. The tumour is invested with a capsule about a line thick, and its interior is composed, chiefly, of small but irregular cells with thick walls, some of which contain a semi-transparent substance. It is, probably, either an alveolar cancer or a cartilaginous tumour softened.

The patient was a man forty years old. The tumour was ascribed to a blow on the arm, received three years previously. Its growth was accompanied with severe pain. Amputation at the shoulder-joint was performed, and the patient recovered.

From the Museum of Robert Liston, Esq.

8. *Tubercle of Bone.*

854. Sections of the heads of the femur, tibia, and fibula of a young person. The osseous tissue is rendered soft and light by atrophy; and the cancellous spaces in a great part of both the epiphyses and the adjacent portions of the shafts are filled with tuberculous matter, which has a coarsely granular aspect. The articular surfaces are healthy, except at one part.

The patient died of pulmonary phthisis after the amputation of the limb.

From the Museum of George Langstaff, Esq.

855. A vertical section of the knee-joint of a child. The cavity of the joint is completely filled with dense false-membranous substance uniting all the articular surfaces. The articular cartilages have been extensively, but for the most part superficially, ulcerated; their sections may be traced over the heads of the bones, to which their remains are still closely united. The section of the patella exhibits a large and rather firm granular mass

of pale yellow tuberculous matter, lying in a cavity in its interior. It projects a little from the inner surface of the patella, and the bone immediately adjacent to it is more vascular than elsewhere. The other bones are healthy in every part.

The disease was of three years' standing.

From the Museum of Sir A. P. Cooper.

9. *Bones variously altered by the Growth of Tumours.*

856. The lower halves of the tibia and fibula of a young person. A great portion of the lower end of the tibia, including its epiphysis, has been removed, and other large portions are separated by ulceration: but the articular cartilage is entire. The fibula is superficially ulcerated at the part adjacent to the tibia. It is most probable that these changes were produced by the growth of a large malignant tumour; and that its primary seat was in the substance of the wall of the tibia; for at the upper part of the chiefly diseased portion, some of the inner layers of the wall remain, preserving the shape of the shaft of the tibia, while the outer layers have been separated from them and carried outwards, as if by the pressure of a growth beneath them. Below this part the outer layers of the wall are lost, but the remaining fragments of the inner layers still represent the proper form of the lower end of the shaft. The remains of the cancellous tissue of the epiphysis and lower part of the shaft are filled with some morbid substance.

Hunterian.

857. The femur of a young girl, around which it is probable that a large malignant tumour grew. The whole of the bone is exceedingly light and porous. The surface of the lower four-fifths of the shaft is ulcerated, and rendered uneven by irregular formations of very light spongy bone. In the lower third, there remains, in the place of the shaft, only a shapeless portion of light porous bone, with traces of a central (medullary?)

cavity. The inferior epiphysis is separated, a great part of its osseous tissue is removed, and its articular surface is ulcerated.

Presented by Robert Keate, Esq.

858. A femur, with the acetabulum, and adjacent parts of the pelvis, broken into several pieces. At and around the seats of the fractures there are large reticular spaces, the cancellous tissue and parts of the wall being almost wholly destroyed by the growth of cancerous tumours within them. A fracture, about four inches below the top of the great trochanter, has been united at an angle of 100° by irregular osseous bands, separated by wide intervals. At the other fractures, which have taken place at the base of the neck of the femur, through the great trochanter, and through the bodies of the ischium and os pubis, there is not any indication of an attempt at union. Two small portions of the body of the ischium are completely separated; the lower part of the acetabulum is destroyed, and its upper border consists of a widely cancellous tissue in which the morbid substance was deposited.

From a woman whose breast had been removed for medullary disease in the mammary gland.

From the Museum of Robert Liston, Esq.

859. A thin irregularly nodulated plate of bone, which was connected with a right parietal bone, and formed the basis of a very large tumour removed from the side of the head.

“ Hannah Jones came into St. George’s Hospital in 1816, with a tumour, the basis of which was bone; but the most prominent part was of a softer substance. It had its origin underneath the external table of the right parietal bone; and the tumour in its progress forward approached so near the outer edge of the orbit, that there was only space to admit the blade of a saw between them.” The tumour was attached all over the right frontal, temporal, and part of the parietal region of the skull, as low as the right eye-brow; and it hung down, in the shape of a great round flask, on the right shoulder, extending outwards further than the shoulder, and fitting in and overlapping the side of the face and neck. It had its origin in the kick of a horse, when the patient was between two and three years old; and had gradually increased.

The patient was twenty-five years old when she came under the care of Sir Everard Home, by whom the operation was performed, on the 9th of October, 1816. “ The

operation was begun by a crural incision through the integuments down to the surface of the tumour; the four flaps of skin were turned back; and all the soft parts of the tumour, which consisted of fat, mixed with steatomatous substance, were removed; and as doing this had occupied a considerable time, the skin was brought over the remaining tumour, and the patient put to bed. The pain had not been severe, and was submitted to with great fortitude. On the next day the skin was turned back, the bony rim surrounding the base of the remaining tumour formed by the external table was exposed all round; and as it was close to the orbit, a saw was so contrived that its blade could be passed between them, having an iron bow fixed upon the opposite side of the blade instead of behind; so that there was no impediment to the working of the saw till the extensive base of the tumour, that consisted wholly of bone, was sawed through. The integuments were then brought forwards; and although they were at first so much too large as to be thrown into folds, they very soon contracted, and in a few days did not extend beyond the surface on which they were laid; and the parts healed in the same manner as any other wound, leaving a firm cicatrix, with a more regular surface than there was reason to expect. In the course of the healing of the parts, no symptoms, either local or constitutional, were produced." *

The patient is at this time (1847) in good health.

Presented by Sir Everard Home.

10. *Uncertain Growths and Various Unorganized Deposits on Bone.*

860. A portion of a parietal bone, to the inner surface of which a small, circular, flat tumour is attached. The adjacent bone is healthy.

Hunterian.

861. Two portions of a skull, removed with a trephine. Both of them are ulcerated, and in one the ulcerated spaces are filled with a fleshy substance.

Hunterian.

862. Section of a finger, on which a small tumour of soft fibrous substance has been formed around the distal end of the first phalanx. The tumour

* Extracted from "A short Tract on the Formation of Tumours;" by Sir Everard Home, Bart. London, 1830, 8vo., p. 12. Sketches of the patient, before and after the operation, are given in this Tract: and there are casts of her head in the Museum.

is intimately connected with the periosteum, and imbedded in a part of the surface of the bone. The flexor and extensor tendons are stretched over its surface. *Hunterian.*

- 862A. Part of the first phalanx of a great toe, nearly surrounded with a mass of gouty deposit. *Hunterian.*

Specimens of Tumours of Bones, and their effects, in other parts of the Museum :—

Cysts, 1033, 3271?

Cartilaginous, 200-1, 1034, 2199.

Osseous, cancellous, 766, 1036-7-8, 3214, 3218-9, 3220.

„ compact, 1035, 1039, 3215-6-7.

Various growths resembling osseous tumours, 3221 to 3236.

Fibrous, 219, 220?

Osteoid, 3237 to 3246, 3247-8?-9?

Medullary, 258, 261, 264, 272, 281A, 287, 302A, 1052 to 1058, 2210?

Melanotic, 287.

Tuberculous, 988 to 992?, 1809.

Cancerous ulceration, 232A, 638 to 640, 2138, 3252 to 3269.

Cysts formed by the growth of tumours, 3249, 3250-1.

SERIES XII.—Sub-Series 7. *Entozoa in Bone.*

863. Sections of part of the ilium of a ruminant. The internal structure of the bone is destroyed, and its walls are expanded by the development of numerous acephalocyst hydatids within it. A portion only of these remain; they are not of large size, and most of them are burst and rolled up. The membranes of some of them are also thickened. The exterior of the bone at the part chiefly swollen, as well as elsewhere, is smooth and evenly rounded; its interior is rough, with projecting points and ridges. *Presented by the Trustees of the British Museum.*

864. “A cyst, which was filled with water, formed in and filling up the bone of an ox.”—*Hunterian MS. Catalogue.*

A vertical section of the humerus of an ox, the whole medullary tube of which is exactly filled by a cyst with thin, white, glistening, and semi-transparent walls, like those of an acephalocyst hydatid. The cyst is

distended with cotton in the form which it had before the fluid was let out from it; it is divided into two portions at the lower end, where the medullary tube also divides, to be continued into the condyles of the humerus. The walls of the bone are sound, and their interior is in contact with the cyst, but not connected to it by any kind of tissue.

The cyst is probably that of an Acephalocyst Hydatid, which, growing in the direction of the least resistance, has caused the removal of all the medullary tissue, of which it now occupies the place. The other section of the bone is preserved in 3270. A specimen, perhaps, of hydatid in the lower jaw is preserved in No. 3271.

Hunterian.

Specimens exhibiting some of the principal affections of the Periosteum :—

Inflammation, 570, 657, 661, 680.

Thickening after injury, 410 to 415, 546, 556, 570, 682-3.

Separation in necrosis, 656-7-8, 660-1.

Formation over new bone, 653, 680 to 685.

Fibrous and other tumours proceeding from, or intimately connected with, the periosteum, 219, 220, 801-2, 835.

SERIES XIII.—INJURIES AND DISEASES OF JOINTS.

Sub-Series 1.—*Dislocations by External Violence.*

THE specimens of Dislocations are arranged according to the seats of injury. The dislocations from disease are placed at the end of the illustrations of those diseases of the Joints in which they have their origin. Of the other injuries to which joints are liable, Wounds of Joints are not placed separately, because their chief interest lies in the diseases of the articular structures which commonly follow them; and Fractures in Joints, not combined with dislocations, are placed with the other specimens of fractures.

865. A vertical section of the upper half of a sternum, exhibiting a dislocation between its first and second portions. The lower portion has passed

more than half an inch upwards behind the upper one; and they are united by deposits of osseous substance in the angles, above and below the separated surfaces.

The patient was a man sixty years old, in whom the injury was produced by a fall from a tree. He sustained some injury of the head, and was delirious for several days. He continued many weeks in a very precarious state, and had purulent expectoration, but gradually recovered, so far as to be able to walk out. He died, however, five months after the accident with stricture and ulceration of the œsophagus. The lungs were found to have extensive adhesions, and appeared to contain some pus. The heart was healthy, but a portion of the pericardium, and of the adjacent part of the lung, were adherent to the injured part of the sternum.

The œsophagus is in No. 1102. The other portion of the sternum is in the Museum of St. Bartholomew's Hospital.

Presented by Joseph Swan, Esq.

866. A section of a healthy shoulder-joint, for comparison with the effects of injury and disease. The section is made in a horizontal plane below the spine of the scapula, and through the middle of the glenoid cavity and of the head of the humerus. *Hunterian.*

867. The other section of the same joint. *Hunterian.*

868. The scapula and the ligaments attached to it, from a shoulder-joint, three weeks after the reduction of a dislocation.

The following account of the dissection of this preparation was left by Mr. Hunter:—

Dislocation of the Shoulder with its Examination after Death.

A man came into St. George's Hospital with a dislocation of the shoulder, which was reduced. About three weeks after he was taken with a fever, and died. I was anxious to examine the state of the parts in so recent a dislocation. As the head of the os humeri had passed into the arm-pit, I paid particular attention to this side of the joint. I first removed the deltoid and pectoralis muscles, with the latissimus dorsi, &c., leaving only those muscles that arose from the scapula.

On viewing those parts, I saw plainly that the subscapularis was much injured at its upper edge, just under the coracoid process, being there mixed with extravasated blood, so as to destroy all regularity of muscular fibres. I now endeavoured to dislocate the

os humeri inwards, under the subscapularis muscle, but could not, although I could make the head of the bone rest on the edge of the glenoid cavity.

On dissecting off the infra- and supra-spinatus muscles, I found nothing uncommon respecting the capsular ligament; but when I dissected off the subscapularis, I found the ligament in some degree injured, so as to have lost a good deal of its uniformity in structure. It was of a darkish blue colour; a consequence of extravasation in part absorbed.

I cut the capsule, &c., round, near to the os humeri, where it was sound, so as to expose the inner surface of the ligament, and found that on the inner surface, between the insertion of the tendon of the subscapularis muscle into it and its fixture to the edge of the glenoid cavity, (it) was injured, corresponding with the external surface, although I could not say fairly ruptured through.

I also found that a circular part of the cartilage on the edge of the glenoid cavity, to which the ligament is fixed, was torn away from the bone, for about an inch of the circle, and which must have been pulled off when the head of the humerus pressed against the ligament: and this is a proof that the head of the humerus must have pressed against the ligament with great force, but it kept its attachment at the two ends to the remainder. The separation was such as could not allow any thing to pass between the bone and it.

There was little or no extravasated blood in the cavity of the joint; but what was very remarkable, and what I did not expect, I found a good deal of pus in the joint. If this is common in such cases, what becomes of it?

We may observe that the ligament of this joint is differently circumstanced from most others: where it is attached to the os humeri, it is strengthened or bound by the tendons of three muscles, and, of course, the weakest part of the ligament is where it is fixed to the scapula.

Here was a case of undoubted dislocation, and yet the capsular ligament not torn where the dislocation was; although it must be supposed that the giving way of the cartilage at the edge of the glenoid cavity admitted the ligament to yield more than it otherwise would.

Although the ligament was not torn so as to let the head of the bone escape through the rent part, yet the head of the bone was certainly out of the socket; and from all the appearances and circumstances taken together, how it got there without doing more mischief I do not understand.—*Hunterian MS.*, “*Cases and Dissections*,” No. 76.

869. A shoulder-joint, in which the head of the humerus appears to have been recently dislocated forwards and downwards. There is a rent, an inch long, in the anterior part of the capsule, near the glenoid cavity: (the larger opening in the upper part of the capsule was artificially made). The subscapular muscle, and other tissues for some distance beneath the coracoid process, appear to have been crushed. On the interior of the capsule are many pedunculated growths; and new bone has been formed in

nodules around the border of the head of the humerus; but these probably existed before the dislocation. The tendon of the biceps is entire.

Hunterian.

870. Section of a shoulder-joint, cut in a horizontal plane, through the middle of the glenoid cavity, long after the incomplete reduction of a dislocation, in which the head of the humerus appears to have been carried forwards. The articular surfaces are only partially adapted; the anterior two-thirds of that of the humerus are not applied against the glenoid cavity, and are separated by a deep depression from the posterior third, which is so applied. The articular cartilages appear healthy; the capsule is shortened, and very much thickened; the long tendon of the biceps muscle is reduced in size.

Hunterian.

871. The other section of the same joint.

Hunterian.

872. A shoulder, in which the humerus was dislocated forwards and downwards, long before death, and was not reduced. The glenoid cavity is diminished in size and depth; its articular cartilage is wholly removed, and the exposed bone, which before dissection was covered with a smooth membrane, is rough. The anterior border of the glenoid cavity is destroyed, and replaced by a shallow concave surface, which forms part of the cavity in which the humerus rested; on its posterior border the glenoid ligament remains; but there is a deep and broad depression at its lower part, over which the tendon of the infra-spinatus muscle passes. The head of the humerus is placed on the anterior part of the scapula, with its upper border half an inch below the coracoid process; it rests on a shallow concave surface, formed partly by the anterior border of the glenoid cavity, and partly by a mass of tough and elastic fibrous tissue, adherent to the front of the scapula; its surface is irregular and flattened, and its articular cartilage, where any remains, is very thin. The shaft of the humerus is directed straight downwards, and appears to have been pretty freely moveable. The coracoid process was fractured half an inch from its extremity; its portions are united by ligament, and are moveable upon

one another. The capsular ligament appears to have been extensively torn at its posterior part, where a portion with a ragged margin, and beset with fibrous pedunculated growths, remains attached to the neck of the humerus; all the rest, except a small piece at the upper part of the joint, and another portion at the lower part, has been removed. The upper half of the subscapular muscle has been removed, but the anterior part of the head of the humerus presents a broad and deep groove, over which the fibres of the muscle passed to their usual insertion. The tendons of the supra-spinous and infra-spinous muscles retain their connections with the humerus; but that of the former is drawn forwards, and much stretched where it passes over the upper and anterior part of the glenoid cavity; and that of the latter is lodged in a deep groove on the posterior border of the same cavity. The teres major, and the lower part of the subscapular muscles, are much relaxed.

From the Museum of Robert Liston, Esq.

873. The bones of a shoulder-joint. The head of the humerus is dislocated forwards, and the posterior half of its articular surface rests on the elevated concave surface of a mass of new bone, accumulated on the anterior surface of the scapula, directly in front of the glenoid cavity, and below the base of the coracoid process: the opposed surfaces are smooth and accurately adapted. The forms of the head of the humerus, and of the glenoid cavity, are but little altered; but new bone is deposited in isolated spots on the original articular surfaces of them both. New bone is also abundantly formed on all the surfaces of bone adjacent to the joint; and a large mass projects from the posterior and lower part of the great tuberosity of the humerus, which appears to have afforded attachment to the elongated tendons of the supra-spinous and infra-spinous muscles, though some portion of it may have been formed in consequence of injury of the tuberosity.

From the Museum of Robert Liston, Esq.

874. A shoulder-joint, in which the head of the humerus was dislocated downwards and forwards, and not reduced. The head of the humerus rests below, and in front of, the glenoid cavity, in a hollow bounded by a deposit

of bone, on the anterior margin of the glenoid cavity, and on the belly of the scapula. The surface of this fossa is in part osseous, hard, and smooth, and in part covered with smooth ligamentous tissue: the posterior portion of the head of the humerus, which rested and moved in it, is flattened, and its articular cartilage appears of natural thickness. Some of the articular cartilage is removed from the anterior part of the head of the humerus, exposing a hard smooth surface of the subjacent bone. The upper and posterior part of the capsular ligament is torn; the margins of the rent, indicated by bristles, are thickened and beset with a fringe of fibrous pedunculated growths. Another portion of the capsular ligament is turned in between the glenoid cavity and the tuberosities of the humerus. The greater tuberosity appears to have been broken off and reunited; for it is very prominent, obliquely placed, and not smoothly continuous with the upper part of the shaft. The tendon of the biceps muscle is entire.

Hunterian.

875. A shoulder-joint, with fracture and dislocation of the humerus. The fracture has separated, in one piece, the head and lesser tuberosity of the humerus; and these, dislocated forwards and inwards, lie on the anterior part of the scapula, half an inch below the base of the coracoid process, the articular surface of the head of the humerus being directed almost straight forwards. The tendon of the subscapular muscle retains its attachment to the lesser tuberosity, the broken surface of which is firmly united to the anterior part of the greater tuberosity. The fractured surface of the upper part of the shaft of the humerus, and of the greater tuberosity, is fixed almost immoveably in the glenoid cavity: the tendons of the supra-spinous and infra-spinous muscles are attached, as in the natural state, to the summit of the tuberosity.

From the Museum of Sir A. P. Cooper.

876. A vertical section of a left shoulder-joint, in which the humerus was fractured and dislocated in the same manner as in the preceding specimen. No osseous union, however, has taken place; the broken surface of the upper part of the shaft is fixed by a thick layer of ligamentous sub-

stance to the surface of the glenoid cavity, and a large quantity of similar substance has been formed about the dislocated head of the humerus, fixing it to the adjacent parts, and almost concealing it. The axillary vessels and nerves are shown passing over, and in close contact with, the articular surface of the dislocated head. The attachments of the pectoralis minor and coraco-brachialis muscles are also shown covering part of the same surface; and the short head of the biceps muscle lies between it and the upper part of the shaft.

From the Museum of Sir A. P. Cooper.

877. The other section, showing the posterior part of the same shoulder-joint, and the bond of union between the fractured surface of the neck of the humerus and the glenoid cavity.

From the Museum of Sir A. P. Cooper.

878. The bones of an elbow-joint, in which the radius and ulna have been dislocated outwards, and partially backwards, and have been fixed by osseous union in their anormal positions. The olecranon and coronoid process, and the greater part of the sigmoid cavity of the ulna, are united to the middle of the posterior surface and margin of the external condyle of the humerus. There appears also to have been a fracture of the border of the external condyle, the fragments of which have been united to one another, and to the surface of the cavity on the head of the radius, by tough and thick ligamentous substance. The articulation between the radius and ulna is natural: and the radius, being fixed only by ligament to the humerus, may have possessed full freedom of rotation.

From the Museum of George Langstaff, Esq.

879. Section of a hip-joint, in which the femur was dislocated backwards, and not reduced. The section was made in a horizontal plane through the lower part of the ilium, an inch above the spine of the ischium, and through the head and neck of the femur and the great trochanter. The head of the femur rests on the upper part of the ischium, with its lower margin on a level with the spine of that bone; the great trochanter is directed outwards; the shaft almost horizontally forwards. The inferior

and inner surface of the head and neck is united by ligamentous tissue to the surface of the upper part of the ischium. A capacious and thick capsule encloses the dislocated head and neck. The acetabulum is reduced in size, and filled with tough ligamentous tissue. The cartilage on that part of the head of the femur which is not adherent to the ischium is thin, and its surface is uneven. *Hunterian.*

880. The upper section of the same hip-joint, exhibiting, more distinctly, the layer of ligamentous tissue uniting the inner surface of the head and neck of the femur to the outer surface of the ischium, and showing that the end of the round ligament, which was torn away from the bottom of the acetabulum, has become firmly adherent to the inner surface of the capsule, near its attachment to the posterior and inferior spine of the ilium.

Hunterian.

881. A hip-joint, exhibiting the effects of dislocation of the femur many years before death. The head of the femur rested on the outer part of the body of the os pubis, in contact with the anterior inferior spine of the ilium; and the posterior surface of the neck and great trochanter rested on the lower part of the ilium and the upper border of the acetabulum, extending backwards to the ischium. The surfaces of the ilium and os pubis have been exactly adapted to the form of the upper part of the femur thus placed in contact with them, and bone has been formed in an elevation which fitted in the concavity of the neck of the femur. In this adaptation of surfaces, the acetabulum is obliterated by the lowering of its border, as well as by the formation of ligamentous tissue in it; some of which tissue, also, extending over the adjacent part of the ilium, appears to have formed adhesions between it and the trochanter and neck of the femur. The head of the femur, deprived of cartilage, is hardened on its surface and conical. The whole head, neck, and trochanter of the femur are enclosed in a thick and very strong new capsule of ligamentous tissue, the upper border of which is attached to the ilium and os pubis, above and in front of the surface adapted to the dislocated femur.

Presented by William Lynn, Esq.

882. An ankle-joint, in which the tibia had been long dislocated. Nearly all the articular cartilage has been removed; the small and thin isolated portions which remain are fixed firmly to the subjacent bone. The surfaces of the tibia and astragalus are smooth and hard, and parts of them are covered with false membrane, by one large band of which they are united together. *Hunterian.*

883. A right ankle-joint, with the parts immediately surrounding it. The shafts of the tibia and fibula are dislocated inwards; the inner malleolus, broken off, retains its connection with the os calcis; and the fibula is broken and splintered about an inch and a half up its shaft. The tendons of the anterior tibial and extensor muscles have slipped outwards; but those of the outer muscles are little displaced. The sole of the foot is directed obliquely outwards.

From a man twenty-eight years old. Some stones fell on him as he was working in a stone-pit, and, in addition to this injury, fractured the os pubis. He died on the eighth day after the accident.

A further account of the case is given in the "Treatise on Diseases and Injuries of the Nerves, by Joseph Swan." Ed. 1834, p. 310.

Presented by Joseph Swan, Esq.

884. The bones of a left ankle-joint and foot. The astragalus has been completely dislocated from its articulation with the os calcis, and carried inwards with the tibia and fibula. It remains connected with the os naviculare, and has sunk nearly an inch below its right level. The tibia and fibula were not injured in the dislocation; the external malleolus appears to have passed behind the elevated articular surface of the os calcis, as if the dislocation had been produced in a forcible rotation of the foot inwards: the point of the malleolus rests on the inner and posterior margin of the tuberosity of the os calcis. In its new position, the astragalus is fixed by bone to the adjacent inner and lower surfaces of the os calcis. The tendons of the peronei muscles appear to have slipped from behind the external malleolus; for there is a deep grooved channel of new bone formed by the side and in front of the lower part of the fibula,

in which it is probable that they were contained. The sole of the foot is flattened, but not otherwise altered in form or direction.

From the Museum of John Howship, Esq.

Specimens of Dislocations by violence in other parts of the Museum :—

At the shoulder, 3272 to 3276 ; the elbow, 3277 to 3280 ; the wrist, 3281.

At the hip, 3282 ; the knee, 3283 ; the ankle, 3284-5.

Sub-Series 2.—*Diseases of Joints.*

IN whichever of the many structures entering into the composition of a joint disease commences, it tends in its progress to affect the others ; and, generally, all or many of them are diseased before, by the removal of the limb or by the death of the patient, an opportunity is obtained for examining them. Hence, in most of the following specimens, many of the structures belonging to the same joint are altered by disease ; and it is not possible to say in which of them the disease commenced. In the general arrangement of this series, therefore, the only object had in view is to display the effects of various morbid processes in each of the chief component structures of the joints ; choosing, for examples of disease in each structure, those specimens in which it is chiefly, though not alone, nor perhaps primarily, affected. The diseases of the synovial membrane are first illustrated ; then those of the articular cartilages. Of the diseases of the articular portions of bones, only such specimens are included as are necessary to complete the illustration of those diseases of the cartilages with which they are usually associated. Among these specimens are placed, for the sake of the additional interest which they have in the history of diseases of the joints, those articular portions of bones which have been excised. The other specimens of similar diseases of bones are arranged according to the changes they have severally undergone, in the preceding Series.

Three sets of preparations have been separated from this plan of arrangement ; namely,—

1st. For the sake of facilitating the comparison of the various forms of suppurative disease of the hip-joint, the specimens illustrating it are placed next after those diseases of the cartilages, and articular portions of bones, to which the majority of them appear most nearly allied.

2nd. The examples of Osseous Anchylosis; it being impossible now to determine the conditions of which, in these specimens, the anchylosis was the consequence: they are placed at the end of the Series together with,

3rd. The examples of the so-called Spontaneous Dislocations, *i. e.* displacements consequent on the several diseases of the joints which are illustrated in the previous parts of the Series.

Section A. *Diseases of the Synovial Membrane.*

Effusions of Lymph and Fluid—Thickening—Formation of False Membranes, &c.

885. A patella, with the tissues in front of a knee-joint. The section of the synovial membrane displays it increased to from two to three lines in thickness, and converted into a uniform, pale, fawn-coloured, close texture, contrasting strongly with the fat and tendinous structures on which it is applied. Its inner surface is nearly smooth, and very like that of a pale mucous membrane. A large mass of granulations, under which a bristle is passed, extends into the knee-joint, from the orifice of a fistulous passage through the skin by the side of the patella. The greater part of the articular cartilage of the patella has been removed by ulceration.

Hunterian.

886. A portion of synovial membrane, from the side of a patella, thickened, indurated, and coarsely granulated on its free surface.

From the Museum of John Howship, Esq.

887. "The cavity of the knee-joint, very much enlarged, and its internal surface inflamed."—*Hunterian MS. Catalogue.*

A vertical section of the knee-joint. The greater part of the articular cartilages has been removed, and the exposed surface of the femur is thinly covered with granulations. The cavity of the joint is so distended

that it reaches nearly four inches above the upper margin of the patella, forming a kind of sac between two and three inches deep, and extending across the whole front of the thigh. The synovial membrane is covered with thin flakes of lymph, and is much thickened.

888. A vertical section of a knee-joint, in which the articular cartilages have been removed, and the greater part of the exposed surfaces of the bones has been united by compact soft tissue. The anterior and upper part of the cavity of the joint is not obliterated; the section exhibits synovial membrane extending far upwards in front of the femur, and uniformly lined with a thin, wrinkled, and granular layer of firm lymph, which is also continued over the exposed portion of the front of the femur. The medullary tissue of the bones has been removed in making the preparation; their walls are very thin, but the remains of their substance appear healthy. *Hunterian.*

889. A vertical section of the lower end of a femur, and of some of the adjacent tissues, from the knee-joint last described. The extension of synovial membrane above the knee-joint appears to be the lining of the subcrural bursa, which opened into the joint, and was diseased like the articular synovial membrane. *Hunterian.*

890. A thin vertical section from the same knee-joint. *Hunterian.*

891. "A knee-joint, nearly obliterated by soft union."—*Hunterian MS. Catalogue.*

All the articular cartilages have been removed. The synovial membrane is thickened, and its surface, as well as that of the bones, is covered with a thick granulated layer of lymph, some of which has been reflected and hangs in loose shreds.

892. A vertical section of an astragalus and os calcis. A thin layer of false membrane lies between the articular cartilages, which are themselves of natural thickness, and appear healthy. *Hunterian.*

893. A vertical section of the lower end of a tibia, an astragalus, and part of an os calcis. Thin layers of false membrane are formed in the articulations, but the cartilages appear healthy. *Hunterian.*
894. A portion of the lower end of a tibia, showing its articular cartilage of ordinary thickness and not altered in structure, but covered with a thin layer of vascular false membrane. *Hunterian.*
895. An astragalus, with a narrow band of false membrane passing from the outer part of its articular cartilage to the synovial membrane lining the posterior ligament of the ankle-joint. Small shreds of false membrane are, also, attached to the surface of the cartilage in front of this adhesion. *Hunterian.*
896. A vertical section of the lower end of a femur, with part of the patella. The greater portion of the articular cartilage has been removed from the femur. That which remains on the anterior part of the condyle is nearly all firmly attached to the bone, but very thin, and its free surface is in several places grooved and made irregular by the ulceration, which, in this case, appears to have proceeded chiefly from the free, towards the attached, surface of the cartilage. The cartilage of the patella is similarly ulcerated on its free surface. A broad band of false membrane extends from the back of the patella to a part of the cartilage remaining on the femur: "which [as Mr. Hunter stated in the MS. Catalogue] shows that cartilage of the joint is capable of taking on adhesions." The exposed surface of the femur appears to be slightly ulcerated, but the substance of the bone is healthy. *Hunterian.*
897. A vertical section of a knee-joint, in which a small band of false membrane passes from between the condyles of the femur to the cartilage in front of the spine of the tibia. A portion of lymph is also attached to the anterior margin of the articular cartilage of the femur. *Hunterian.*

898. A knee-joint, in which acute inflammation was excited by ulceration spreading into it from an issue made near the outer side of the patella. The ulcerated passage is between two and three lines in diameter; a portion of whalebone is placed in it. The articular cartilage of the femur is slightly ulcerated on part of its free surface, and a broad band of soft and vascular false membrane extends across part of the surface of the inner condyle, and from its cartilage to that of the patella, of which it covers the greater part. Another and thicker band of adhesion extends from the synovial membrane, just below the aperture into the joint, to the opposite part of the external condyle.

From the Museum of Robert Liston, Esq.

899. A knee-joint, the cavity of which is completely obliterated by tough adhesions. The patella has been forcibly torn away from the outer condyle of the femur, to which it was united by bone. All the articular cartilages have been removed, and the exposed surfaces of the bones (where they were not ossified together) are rough, nodulated, and covered with an irregular layer of tough fibrous tissue, intersected by glistening bands.

Hunterian.

Principal specimens of Diseases of the Synovial Membrane in other parts of the Museum :—

Nos. 80, 117-8, 507, 509, 510, 516, 533, 700.

Formation of new synovial membrane, 464 to 470.

Section B. *Diseases of Articular Cartilages.*

IN the following specimens, from 900 to 927, the chief facts which are illustrated are these:—1st. [from 900 to 907] The most common form of ulceration of articular cartilage, usually occurring in acute disease of the joint, affecting first the free surface of the cartilage, then making progress in both width and depth, and so removing its substance that the diseased part looks as if one or more portions had been smoothly chiselled from it. The size and shape of such ulcers are uncertain; they often destroy the greater part of the cartilage; their borders are generally inclined or *bevelled* towards their centres; their

bases may be smooth, or may present some irregularity of surface, but rarely if ever exhibit any abrupt prominences or depressions. The cartilage which bounds the ulcers commonly appears, if examined during the progress of the disease, soft, villous, succulent, lustreless, and of a pale yellowish colour; but, if the disease have ceased, it may appear quite healthy; in either case, it retains its intimate adhesion to the bone. When, by the progress of such ulceration, the bone is exposed, it may remain healthy, the disease ceasing abruptly at its surface; or it may ulcerate and be covered with lymph or granulations, and may assume any of the conditions observed during or after the ordinary forms of ulceration of the articular portions of bones.

2nd. [from 908 to 910] A rarer form of ulceration, which may exist alone or be associated with the preceding, and in which the cartilage is perforated by little round pits or channels, like worm-eaten passages, going straight or obliquely towards the bone. This form also appears to be the result of acute disease. As it makes progress, the little ulcers enlarge, and, some of them coalescing, their original form may be lost in a larger irregular ulcer, with abrupt uneven margins, exposing more or less of the subjacent bone.

3rd. [from 911 to 916] The diseases in which the connection between an articular cartilage and the subjacent bone is destroyed by the ulceration of the corresponding surfaces of one or both of them. This form of ulceration may exist alone, or together with one or both of the preceding: in all cases the diseased cartilage, if not separated or exfoliated from the bone, is easily separable, and may be stripped off in one or more pieces: in this respect it differs widely from the cartilage left after either of the preceding forms of disease, which always appears to retain its natural attachment to the bone.

4th. [from 917 to 927] The ulceration of bone which succeeds or accompanies the foregoing diseases of the cartilages.

The Suppurative Diseases of the Hip-Joint are placed after these [from 928 to 941]; and are succeeded by the specimens of *Fibrous Degeneration* of the Cartilages, including those of the rheumatic and gouty diseases, in which the changes of the cartilages, though perhaps not always primary or alone, are usually the most obvious.

900. A knee-joint, from which the articular cartilage has been in several places removed by ulceration extending from the free towards the attached surface. The disease affected especially the cartilage of the femur, of which a large portion has been completely removed. The surface of the exposed subjacent bone is smooth, hard, and apparently quite healthy.

The portions of cartilage which remain appear to be of healthy texture, and firmly adherent to the bone; some of these portions are thin, and uneven on their free surface; others are of the ordinary thickness, and have smooth external surfaces: of the latter, the edges invaded by the ulceration are sharp and abrupt; but the edges of the former become gradually thinner. The progress of the disease by which these changes were produced is well shown near the inner border of the patella, where the same kind of ulceration was destroying a small circumscribed portion of the articular cartilage. The ulceration of this part, becoming gradually more limited in extent as it proceeded to a greater depth through the cartilage, had only at its centre reached the surface of the bone. The synovial membrane is more than usually vascular, and somewhat thickened; shreds of lymph are attached to some parts of its surface.

From the Museum of Robert Liston, Esq.

901. An astragalus, from the upper and lateral surfaces of which the anterior half of the articular cartilage has been removed, apparently by ulceration proceeding gradually from its free surface. The exposed bone is smooth, hard, and apparently healthy. The remaining cartilage (except in one situation, where there is a small shallow ulcerated depression on its surface) appears of healthy texture; its ulcerated edges are gradually and very thinly bevelled towards the exposed bone, to which both they and the rest of the cartilage adhere, as in the healthy state.

Hunterian.

902. The lower end of a femur, from which nearly the whole of the articular cartilage, except its borders, has been removed. Of the central parts of the cartilage only a few exceedingly thin portions remain: the edges of the portions which remain at the borders of the condyles are bevelled towards the surface of the exposed bone, on which, as they become thinner, they are gradually lost. The texture of the cartilage, and its connection with the bone, appear quite natural.

Hunterian.

903. The proximal row of the bones of a carpus. Large portions of the articular cartilages have been removed by ulceration. The portions of carti-

lage which remain are firmly adherent to the bone, and their margins are very thin, though not so smoothly bevelled as in the preceding specimens. The exposed surfaces of bone appear healthy. *Hunterian.*

904. A patella, from which one half of the cartilage has been removed, apparently by the same mode of ulceration as is shown in the foregoing specimens. The borders of the remaining portion are closely fixed to the bone, and shelve gradually towards its exposed surface. Part of the exposed bone is superficially ulcerated, and a thin layer of lymph has been formed on it. *Hunterian.*

905. "The knee-joint of a boy, who had a white swelling come to suppuration."
—*Hunterian MS. Catalogue.*

Nearly the whole of the articular cartilage is removed from the internal condyle and the trochlea of the femur: a small isolated portion, thinned by ulceration of its free surface, and partially detached from the subjacent bone, remains alone upon the trochlea. The cartilage of the external condyle appears healthy, both in texture and connection with the bone: it presents a thick and slightly shelving margin at the limit of the ulceration. The bone exposed by the ulceration, and probably itself superficially ulcerated, is covered with granulations, which are very thick and prominent at its outer border. The cartilage over the patella is healthy. The synovial membrane is thickened, especially on the inner side, and bristles set on this part of it, in a line with others fixed at the borders of the thick granulations on the femur, appear to indicate that the inner part of the cavity of the joint was separated from that part which has remained healthy, by a partition formed by the adhesion of the synovial membrane to the front of the femur. *Hunterian.*

906. An astragalus, from the upper and lateral surfaces of which all the articular cartilage, except a thin strip of its anterior border, has been removed, probably by ulceration extending from the free surface. The whole of the upper part of the exposed surface of bone, except the anterior and inner angle, is superficially ulcerated, very vascular, and covered with lymph

and granulations. The anterior and inner angle is deprived of cartilage, but its surface looks healthy. All the adjacent parts of the joint appear to have been acutely inflamed. *Hunterian.*

907. A knee-joint, from which nearly all the articular cartilages have been removed: isolated portions alone remain, and these are thin and uneven on their free surface, but, for the most part, firmly attached to the subjacent bone. The bones exposed by the removal of the cartilages are covered with granulations and lymph. The synovial membrane is thickened, especially round the borders of the cartilages, and thick layers of granular lymph are deposited on parts of its free surface.

The patient was a man twenty-seven years old. The disease was of long standing, and his health was much impaired. When the limb was amputated there were ten ounces of pus in the joint.

From the Museum of Robert Liston, Esq.

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908. A section of the lower end of the femur of a boy ten years old. The articular cartilage has been extensively ulcerated on its free surface. The ulcers present two principal forms: one (resembling that shown in some of the preceding preparations) is that of broad, smoothly bordered, and, for the most part, shallow, depressions of the surface of the cartilage, as if portions of it had been chiselled off; the other, that of numerous distinct circular pits or channels, not more than one-fourth of a line in diameter, which penetrate obliquely into the substance of the cartilage. Some of these channels appear to reach the substance of the bone, or of the preparatory cartilage (for the ossification of the epiphysis is incomplete); and some are nearly filled with a substance like lymph or granulations; they, altogether, give the cartilage a peculiar worm-eaten appearance. The sides of the condyles, and the fossa between their posterior parts, are covered with thin layers of lymph, and so is one of the larger depressed ulcers. The portions of cartilage remaining between the ulcers appear healthy.

The disease was of more than three months' standing. At first there was a small tumour, containing some fluid, just above the patella: but it had no appearance of

being an inflammatory swelling, and there was only slight enlargement and tenderness of the joint. The tumour was opened, and some serum let out: its cavity then suppurated, and an extensive abscess formed, which required to be more widely opened. A mass of *fungous* granulations protruded from the opening, hectic fever ensued, and amputation was judged necessary. Ten days after it was performed, though the progress of the stump appeared favourable, symptoms of affection of the brain ensued, with which, in ten days more, the child died.

The knee-joint, when first examined, contained some serous fluid. The cartilage of the patella was ulcerated, and its substance "partially necrosed." The ventricles of the brain were distended with nearly three ounces of serous fluid.

From the Museum of John Howship, Esq.

909. A vertical section of a knee-joint. The articular cartilage is nearly all removed from the head of the tibia, and the exposed surface of bone is covered with lymph. The cartilage of the patella appears healthy: of that of the femur, the posterior part has been nearly all removed by irregular ulceration, and the exposed bone is covered with flakes of lymph. Anterior to this irregular ulceration, the adjacent border of the remaining cartilage is gradually thinned towards the bone; a large portion of its free surface is soft, rough, and perforated by numerous small circular ulcers, which, like those in the preceding specimen, penetrate deeply into its substance. A few of these small ulcers have coalesced; and those at the very border of the cartilage are of larger size, and have reached the surface of the bone. The synovial membrane is thickened, and consolidated with the surrounding tissues. The bones appear healthy.

Presented by Sir William Blizard.

910 The upper end of a tibia, the cartilage of which is ulcerated in the same manner as that of the condyle of the femur last described. On one of the semilunar fossæ a large portion of the surface of the cartilage appears soft, and is rough and perforated by a few round apertures. From the other fossa, the greater part of the cartilage has been wholly removed. The subjacent bone appears very vascular on its exposed surface.

Hunterian.

911. One of the condyles of a femur. The articular cartilage is superficially

and irregularly ulcerated on nearly all its free surface; its outer border is the only part which remains unaltered. The whole of the ulcerated part of the cartilage easily separated from the bone, which is itself superficially ulcerated, but in its interior appears healthy. Of that surface of the cartilage by which it was attached to the bone, the greater part appears healthy in form and texture: some of it has minute spicula of the ulcerated surface of the bone fixed to it, and some appears ulcerated after the same manner as the free surface. *Hunterian.*

912. The patella, with the adjacent parts from the same knee-joint. The connection between the cartilage and the bone is almost wholly destroyed; and the cartilage has been nearly all reflected. The greater part of the under surface of the cartilage thus exposed appears healthy: its free surface is superficially ulcerated. The surface of the bone beneath the reflected cartilage is thinly covered with lymph or granulations. "This person had a white swelling."—*Hunterian MS. Catalogue.*

913. The end of a metacarpal bone, from which the articular cartilage, after being softened and made irregular by previous disease, is nearly all separated in one piece. The subjacent bone is superficially ulcerated, and covered with a thin layer of transparent jelly-like substance, probably macerated granulations. *Hunterian.*

914. One of the condyles of a femur. A large portion of its articular cartilage has been wholly removed by ulceration. The remainder, thinned, uneven on both its surfaces, and in several places perforated, is fixed to the bone by its outer border alone. The exposed surface of the bone is covered with granulations; its interior appears healthy. What remains of the synovial membrane is thickened, and forms a deep swollen border overlapping the outer edge of the cartilage. *Hunterian.*

915. One of the condyles of a femur, from which two large portions of the articular cartilage were nearly detached by superficial ulceration of the

bone, and of the surface by which they were fixed to it; their free surfaces are healthy. In the middle of the condyle, a large portion of the whole thickness of the cartilage has been completely removed, and its place is occupied by a soft tissue, continuous with the thickened synovial membrane round the border of the articular surface. At the anterior part, also, the whole thickness of the outer border of one of the nearly detached portions of cartilage has been removed, and its place is in like manner occupied by the thickened synovial membrane with which the soft tissue just mentioned is continuous. The bone, superficially ulcerated, has been painted red, to make the separation of the cartilage more manifest. *Hunterian.*

916. The bones of an ankle-joint, from the articular surfaces of which, after the removal of the cartilages, abundant vascular granulations have been produced. *Hunterian.*

Specimens of Ulceration of Articular Cartilages in other parts of the Museum :—

Nos. 365, 500-1-2, 533, 711-2, 762-3-4-5, 768-9, 885, 887 to 891, 896, 898-9, 928-9, 931-2-3-4, 973-4.

917. The corresponding articular extremities of a humerus, radius, and ulna, excised from a woman twenty-six years old. Nearly all the cartilages have been removed: the portions remaining on the humerus and radius are thin, irregularly perforated, and almost entirely detached from the bones. The exposed bones are, for the most part, superficially and smoothly ulcerated; the surface of the great sigmoid cavity of the ulna is covered with granulations.

The patient recovered after the operation.

From the Museum of Robert Liston, Esq.

918. A knee-joint, of which the blood-vessels have been minutely injected. The greater parts of the articular cartilages have been removed from all the bones. The portions which remain are thin strips of their borders, and some larger pieces on the patella and on the posterior parts of the condyles of the femur. These portions are all ulcerated on their free surface; they are, also, in many places, separated from the subjacent bone by a

layer of vascular lymph, and at their borders are surrounded with granulations which fit into all their irregularities. The surface of the exposed bone is very vascular, ulcerated, and covered with lymph. The synovial membrane is thickened. The tibia and fibula are drawn backwards, and the crucial ligaments are elongated.

From a case of acute inflammation of the joint, produced, it is believed, by a penetrating wound.

Presented by Sir William Blizard.

919. One of the condyles of a femur. At its anterior part, a portion of articular cartilage has been separated after ulceration of the surface of the bone, on which there is now a thin layer of granulations. Another portion of cartilage in this situation has been wholly removed, and the bone here exposed appears to be covered with a thin layer of false membrane, portions of which also are fixed in flocculi to an adjacent superficially ulcerated part of the cartilage. On the posterior aspect of the condyle another circumscribed portion of cartilage appears thinned by ulceration of its free surface, and is covered with fine flocculi of false membrane. *Hunterian.*
920. The carpal ends of a radius and ulna. All the articular cartilage is removed from the radius, and the exposed surface of bone is covered with a thick layer of compact and vascular false membrane. *Hunterian.*
921. A finger, with part of its metacarpal bone. The articular cartilages have been in part removed from the corresponding ends of the metacarpal bone and first phalanx, and the exposed surfaces of bone are covered with granulations. *Hunterian.*
922. The head and neck of a humerus, excised from a man twenty-one years old. All the articular cartilage has been removed. The subjacent bone is superficially, and, for the most part, evenly ulcerated, light and spongy. The wall of the neck is thin, and its laminae are expanded: there is a considerable formation of new bone on the tuberosities, and about the attachment of the capsular ligament.

The patient was of scrofulous habit. An abscess in the shoulder, communicating with the joint, had long discharged profusely. After the excision of the head of the bone, the limb was fixed in one position, the discharge gradually diminished, and the recovery, though tedious, promised to be complete. When discharged from the Infirmary the patient had some power of moving his limb.

From the Museum of Robert Liston, Esq.

923. A similar specimen, except that less new bone is formed around the joint.

From the Museum of Robert Liston, Esq.

924. The corresponding articular extremities of a humerus, radius, and ulna, excised from a woman thirty-five years old. All the articular cartilages have been removed, and except in one situation, on the head of the radius, all the subjacent bones are more or less deeply ulcerated. The exposed bone, as well as all that was removed, is light, dry and spongy; and in some places the layers of the compact substance are separated.

The patient had had disease of the joint during childhood, but had recovered. The disease for which the excision was performed was of nineteen months' standing. She recovered after the operation, and the limb was flexible.

From the Museum of Robert Liston, Esq.

925. A similar specimen. The articular surfaces of the bones are superficially and evenly ulcerated, and some new bone has been formed upon the condyles of the humerus and the olecranon.

The patient was a man twenty-five years old. The disease had existed fourteen months. He recovered after excision of the bones, but with a stiff elbow.

From the Museum of Robert Liston, Esq.

926. A similar specimen, except that the ulceration of the humerus and ulna is deeper and more irregular, and parts of their ulcerated surfaces are united in a close osseous ankylosis.

From a woman twenty-three years old. The disease was of three years' duration, and accompanied with firm œdema of the fore-arm and hand. After the excision of the parts preserved she recovered, but with a stiff elbow.

From the Museum of Robert Liston, Esq.

927. A scapula, clavicle, and humerus, exhibiting the further progress and accompaniments of the ulceration of the articular portions of bones shown in the preceding specimens. The greater part of the head of the humerus is destroyed by ulceration, which has also formed a deep cavity in the top of the shaft, and has removed part of the great tuberosity. The glenoid cavity is superficially ulcerated, and the surfaces of all the bones adjacent to the shoulder-joint are covered with abundant deposits of new bone. The bone exposed by the ulceration has the aspect of healthy cancellous tissue, and, at the anterior part of the cavity formed in the head of the humerus, is partially covered with a thin layer of compact tissue, as if a process of healing had there commenced.

From the Museum of Robert Liston, Esq.

Specimens of Ulceration of Bone connected with diseases of the Articular Cartilages in other parts of the Museum :—

Nos. 607 to 618, 621-2-3, 928-9, 931 to 941, 3286 to 3311, and others referred to at page 109.

Specimens of Necrosis of Articular portions of Bones :—

Nos. 669 to 674, 677, 689, 690, 696 to 700, 704, 710-1, 762-3, 3173, 3184.

Ulceration extending into Joints through diseased heads of Bones :—

Nos. 685, 692, 729, 741, 746-7.

Suppurative Diseases of the Hip-Joint (Morbus Coxarius: Coxalgia).

928. The hip-joint of a child. The cartilage of the head of the femur, to a wide extent, has been separated from the bone after ulceration of thin layers of their contiguous surfaces. The ulceration of the bone has also extended irregularly down the inner part of the neck to below the lesser trochanter; the whole of this space is rough, and covered with lymph or tuberculous matter. The round ligament has been destroyed, and large portions of cartilage have been removed from the acetabulum, leaving the rest with abrupt ulcerated margins, but closely connected with the subjacent bone. A portion of the capsule remains, and is covered with lymph.

From the Museum of Sir A. P. Cooper.

929. The right hip-joint of a child. Nearly all the cartilage has been removed

from the head of the femur, and the free surface of what remains is made irregular by ulceration. The exposed surface of the bone is covered with lymph and granulations, and its head and neck appear somewhat reduced in size. The acetabulum is increased in width and flattened: all its articular cartilage is removed, and its place is filled with lymph and granulations. The whole of the cartilage between the ilium and the ischium, and the ischium and os pubis, has also been removed by ulceration; but the surface of the ilium on which it was applied appears sound. The round ligament is destroyed; and what remains of the capsule is shortened, thickened, and lined with lymph. *Hunterian.*

930. The hip-joint of a child, in which the round ligament appears to have ulcerated through its middle; its remains retain their natural attachments. A considerable quantity of lymph is deposited in the acetabulum, and a large ulcerated aperture extends through the lower and inner part of the capsule. The bones and cartilages appear healthy.

From the Museum of George Langstaff, Esq.

931. The hip-joint of a young person. All the articular cartilage has been removed from the head of the femur, except that around its base, part of which remains irregular, partially detached, and perforated by many round apertures. The subjacent bone is also ulcerated, so that the head is flattened and much diminished in size. The round ligament remains attached to the head of the femur, but is separated from the acetabulum, and hangs loose and flocculent. All the cartilage is removed from the acetabulum, and its cavity, somewhat increased in depth, is nearly filled with lymph. The capsular ligament is thickened. A part of it is preserved, through which two small ulcerated apertures (marked by portions of whalebone), one in front of the trochanter, the other below it, lead to fistulous canals through the integuments. There is also an ulcerated passage leading from the acetabulum through the substance of the iliac portion of its border.

The disease was of long standing, and the limb was much shortened, though the head of the femur remained in the acetabulum.

From the Museum of Robert Liston, Esq.

932. A hip-joint, in which the head of the femur, deprived of all but the outer border of its articular cartilage, superficially ulcerated, and covered with a thin layer of lymph, was dislocated nearly straight upwards. The posterior part of the neck, which rested on the edge of the acetabulum, is flattened and depressed; and all the fibrous tissue around the neck is thickened. New bone has been formed on the upper border of the acetabulum, and there is a very capacious capsule of tough fibrous tissue around the head and neck of the femur. A small aperture through the bottom of the acetabulum is filled with soft substance. *Hunterian.*

933. A child's hip-joint, in which a great part of the floor of the acetabulum has been destroyed by ulceration, and the cavity of the joint opens into the pelvis by an irregular aperture, about an inch in diameter. Nearly all the head of the femur, also, has been removed by ulceration: its remains protrude through the aperture into the pelvis. The capsule of the joint is thickened and contracted.

The disease was two years in progress.

From the Museum of Sir A. P. Cooper.

934. A hip-joint, from an adult, in which the head and a part of the neck of the femur have been destroyed by ulceration. There has also been extensive ulceration of the acetabulum, through the walls of which are two fistulous passages, indicated by portions of whalebone. One of these passages extended obliquely through the bottom of the acetabulum, and in front of the spine of the ischium, to the rectum, into which it opened by a large orifice.

The patient was a boy fourteen years old. The disease of the hip-joint was of long standing, and air used to pass with a quantity of foetid thin discharge from a fistulous opening in the back of the thigh.

From the Museum of Robert Liston, Esq.

935. The lower part of the rectum mentioned in the preceding description, in the walls of which, two inches from the anus, is an aperture one-third of an inch in diameter. It leads to a short fistulous passage in

the thickened coats of the intestine, through which the communication was formed with the interior of the diseased hip-joint.

From the Museum of Robert Liston, Esq.

936. A hip-joint, in which, after the head and part of the neck of the femur had been destroyed by ulceration, the shaft was drawn up, so that the remains of the neck rest on the ilium just above the brim of the acetabulum. In this position, the neck of the femur is fixed to the ilium by thick and tough bands of fibrous tissue. The capsular ligament has been removed: the acetabulum is filled with dense fibrous tissue. The walls of the bones are very thin and light.

From a woman seventy years old. Ten years before her death she had an apparently scrofulous affection of the hip; abscesses communicating with the joint opened in the groin, and ultimately the limb was much shortened and inverted. The diseased parts, however, had completely healed. The patient died of apoplexy, and part of her brain is preserved, No. 2054. After death, her lungs and liver were found tuberculous.

From the Museum of George Langstaff, Esq.

937. A vertical section of the bones of a hip-joint. The articular cartilages are removed, and the subjacent bone is rendered rough and uneven by superficial ulceration. The denuded surfaces of bone are in contact, but have not coalesced; a thin layer of soft tissue intervenes between them. New bone has been deposited around the base of the head of the femur: its interior appears healthy, except that, near the base of the great trochanter, there is a small, smoothly walled cavity in the midst of the cancellous tissue, which was probably filled with medulla.

From the Museum of George Langstaff, Esq.

938. The other section of the same femur, macerated and dried.

From the Museum of George Langstaff, Esq.

939. The bones of a hip-joint. The head of the femur has been almost entirely removed by ulceration, and a small portion of its lower border alone remains; its exposed surface presents a healthy cancellous tissue. There

are traces of superficial ulceration of the neck, and new bone has been deposited about the attachment of the capsular ligament, and along the linea aspera. The acetabulum is extensively ulcerated; all its margin is destroyed, and at its floor, a wide irregular opening into the pelvis nearly separates the pubic and ischiatic portions from the iliac portion of the os innominatum. The tissue of all the bones is light, dry, and spongy.

The patient was twenty-five years old. Eighteen months before his death, having for some time previously had pain in the hip-joint, he received a kick from a horse behind the great trochanter. The accident was followed by exceeding pain and tenderness in the groin, shortening and eversion of the limb. An extensive abscess formed on the inner side of the thigh, under the exhausting discharge from which the patient died.

From the Museum of Robert Liston, Esq.

940. The bones of a hip-joint. There is a large ulcerated aperture through the bottom of the acetabulum; and its edges, though irregular, are smoothly rounded, as if it had long existed and been partially healed. The rest of the surface of the acetabulum is unevenly ulcerated, and its cavity is much increased in depth by an irregular accumulation of bone upon its upper and posterior margin. The whole of the ilium is thickened, and new bone is deposited abundantly upon its crest. The head of the femur is reduced in size, and flattened by ulceration, so that it is less than half an inch in depth. Its surface is nodulated, and projected a little through the upper and posterior part of the hole in the acetabulum. The neck of the femur is shortened, and the shaft having been drawn upwards and backwards, with extreme flexion of the thigh upon the trunk, the upper part of the base of the neck was in contact with the new bone deposited on the border of the acetabulum, and has had a corresponding portion of new bone deposited on its own surface, so as to form a kind of false joint. A similar but smaller deposit of new bone has taken place on the inferior part of the neck close by the trochanter minor, and presents a rough but nearly level articular surface. Upon this surface rested a portion of the head of the femur, detached after necrosis or ulceration, an inch and a half in diameter, and about half an inch thick, including the place of attachment of the round ligament. Part of the original articular sur-

face of this portion of the femur is ulcerated; but the remainder, which appears to have rested in a depression on the front and outer part of the os pubis, is healthy. Part of the surface at which the loose portion of the femur was detached is smooth, in correspondence with the surface already described on the lower part of the neck.

The patient was an old man, who died soon after receiving a fracture high up in the shaft of this femur. The disease of the joint was of long standing.

From the Museum of Robert Liston, Esq.

941. A hip-joint, from a case in which the head, neck, and trochanters of the femur were excised twelve years before death. Both the os innominatum and the remains of the femur are slender, small, and light. The upper part of the shaft of the femur is placed opposite the posterior part of the acetabulum, to which, as well as to the adjacent part of the ilium, it is firmly but moveably attached by dense ligamentous tissue, portions of which appear to be formed of the capsule of the joint doubled in between the bones. Connected with the same tissue, and with the upper part of the shaft, is a portion of muscle, enclosed and mingled with cellular tissue.

Four years and a quarter before the excision of the bone, the patient, a boy, at that time nine years old, was thrown down. The injury was followed by disease of the hip, which was treated with leeches, blisters, rest, and other usual means. Large abscesses formed, and burst around the joint, with extreme pain and copious discharge of pus; and the head of the femur was dislocated far on the dorsum ilii. The patient was reduced to a very debilitated state; and, during the two years and a half in which the discharge continued, became exceedingly emaciated: but for some months before the operation no fresh abscesses formed, and the progress of the local disease appeared to be checked.

Mr. White "removed the head and neck of the femur with a portion just below the trochanter minor, from the dorsum of the ilium." "The operation was effected by dividing and separating the integuments from a little above the point of lodgment down to that opposite the site of the acetabulum. At this point the bone was divided with a small straight saw about two inches below the top of the great trochanter, raised with a spatula, and then carefully detached from the ilium. The knee, which had long been immoveably imbedded in the opposite thigh, was now with facility brought into a straight line, and the whole limb was secured with a long splint, and treated as a compound fracture. The wound quickly healed, the various sinuses soon ceased to discharge, and the health of the patient rapidly improved. Within twelve months a most useful compensation for the loss of the original joint was obtained. Perfect

flexion, and extension, and every other motion except the power of turning the knee outwards, were restored: but the femur did not grow after the operation."

The patient lived five years after the operation; and died consumptive.

A further account of the case is in "A System of Surgery, by J. M. Chelius; translated by J. F. South." Vol. ii., p. 979. London, 1847.

Presented, with the foregoing history, by Anthony White, Esq.

Specimens of Disease of the Hip-Joint in other parts of the Museum:—

Nos. 3312 to 3331.

Fibrous Degeneration of Articular Cartilage.

942. "The patella of a man who died after having bruised his knee."—*Hunterian MS. Catalogue.*

The central portion of the articular cartilage is irregularly cracked in several directions: all the cracks pass through its substance in planes perpendicular to the surface of the bone. It is probably an example of the beginning of the fibrous degeneration of cartilage; though, except in the appearance of being cracked, the texture of the cartilage is not altered.

Hunterian.

943. A patella, of which a part of the articular cartilage presents the fibrous degeneration in a more advanced stage. Of the diseased part, some small portions have been removed; the rest is changed into short, thick, and soft fibres, which are closely set perpendicularly to the surface of the bone. The length of most of these fibres is about equal to the natural thickness of the cartilage, but around the margin of the diseased part many are twice as long, and hang like loosely attached coarse threads. In the neighbourhood of the same part, the cartilage is cracked in several directions, and appears as if it had been in progress towards the change just described. The synovial membrane and other parts connected with the patella are healthy.

Presented by Sir William Blizard.

944. A patella, on which the same disease has proceeded to a further degree. A great part of the cartilage, after being resolved into fibres, has been wholly removed. The surface of the exposed bone is hard, and smooth,

in some parts polished, in some slightly nodulated. The remaining cartilage, immediately around the margin of the exposed bone, is, for the most part, changed into long, close-set, loosely hanging fibres; and that which is more distant, and nearer the outer border of the patella, is cracked, and, as it were, breaking up in various directions. The margin of the patella is beset with large flattened nodules of new bone.

Presented by Sir Everard Home.

945. The head of a femur, on which the free surface of the cartilage, covering a space half an inch in diameter about the attachment of the round ligament, is shreddy and flocculent, having undergone, probably, the same change as is shown affecting the whole substance of the cartilage in the preceding specimens. Nearly the whole of the round ligament has been removed.

From a man twenty-five years old.

Presented by Joseph Swan, Esq.

946. The head of the other femur of the same person, exhibiting similar disease of the corresponding part of its cartilage. Portions of it are more degenerated than in the preceding specimen, and some are completely removed; but the round ligament is entire.

Presented by Joseph Swan, Esq.

- 946A. Section of the upper part of a femur, from the middle of the head of which a large portion of the articular cartilage has been removed. The bone thus exposed is unnaturally hard; its surface is polished like ivory; and the morbid hardness extends for about a line in depth. Of the remaining cartilage, some is softened, thick, succulent, and nodulated on its surface, while that round the margin of the exposed bone is very thin; other parts are marked with grooves, like wrinkles, radiating to the outer margin of the head; and others are converted into fibrous tissue, long shreds of which hang from the surface of the bone. New bone, in hard irregular nodules, is formed round the margin of the head, and on the neck, of the femur.

The patient, a man forty-two years old, had rheumatic pains of the hip during the last four years of his life. He died with medullary disease of the ilium. The other section of the femur is in the Museum of St. Bartholomew's Hospital.

Presented by Edward Stanley, Esq.

947. A knee-joint, in which the cartilages on the femur and patella have undergone changes like those last described. In some situations they are wholly removed, leaving the subjacent bone smooth and hard; in others they are cracked and fibrous; and in the rest of their extent they are very thin. The synovial membrane around the borders of the cartilages is beset with groups of long, narrow, leaf-like processes of fat, covered with a continuation of the membrane, some regularly formed, some shreddy, some branched. The cavity of the joint appears to have been much distended; at its upper part the synovial membrane is covered with thin films of false membrane, and near its outer boundary a slender fibrous band passes from one wall to the other.

Eleven or twelve years before death there had been copious effusion into the joint.

From the Museum of John Howship, Esq.

948. A hip-joint similarly, but more, diseased. The synovial membrane is in many situations, on both the capsule and the neck of the femur, thickly beset with groups of pedunculated, leaf-like, branched and shreddy processes, like those last described, but for the most part larger. The intervening portions of the synovial membrane appear healthy. With the exception of that about the round ligament, nearly all the cartilage has been removed from the head of the femur and the acetabulum, and much of the remainder is cracked and fibrous. The exposed surfaces of the bones are hard and smooth; and the borders of the head of the femur are enlarged and covered with nodulated hard new bone.

From a woman sixty-one years old, who had been lame in this joint for many years, and in her last year of life had suffered much pain in it. The neck of the femur appeared unusually short, but was of healthy texture. There was a small cartilaginous and osseous tumour near the lower end of the tibia.

From the Museum of John Howship, Esq.

949. The knee-joint of a man sixty-four years old, who had for many years suffered from gout. The articular cartilages have been removed, and the borders and parts of the articular surfaces of the femur and tibia are thickly beset with nodules of hard new bone, of various size and shape, covered

with thin layers of fibrous tissue. Among these, also, are numerous small pedunculated growths, leaf-like, and swollen at their free extremities; and similar growths, most of which are not more than two or three lines in length, are attached, singly and in groups, to nearly all the internal surface of the synovial membrane. The synovial membrane is distended and thickened, and flakes of recently formed lymph are adherent to some parts of it.

The joint was greatly distended with lymph, coagulated blood, and an oil-like fluid. The other knee-joint and the wrist-joints were similarly diseased, but to a less extent.

From the Museum of George Langstaff, Esq.

950. An astragalus, from a gouty person. Its articular cartilages are in some parts thin: in others, small portions of their borders appear to have been removed by chronic ulceration. *Hunterian.*

951. The os calcis of the same foot, similarly diseased. *Hunterian.*

Specimens of Fibrous Degeneration of Articular Cartilages, and of the Affections of the Bones therewith connected, in other parts of the Museum:—

Nos. 508, 510-11, 535, 571-2, 626-7-7A, 881, 953-4-5, 972, 3311? 3322 to 3339, 3340-1-2?

SERIES XIII.—Section C. *Tumours in Joints.*

952. A vertical section of the knee-joint of a young person, nearly all the cavity of which is filled with a tumour projecting into it from behind, and surrounding the crucial ligaments, one of which is shown on the surface of the section. The tumour is lobulated, and appears to be composed of firm and elastic, fibrous, vascular substance: it has united with the surfaces of the cartilages, with which it is in contact; and the cartilages themselves are very thin. The upper and anterior part of the joint, upon which the tumour has not encroached, is healthy. *Hunterian.*

Specimens of Tumours growing into or involving Joints in other parts of the Museum:—

Nos. 218, 256-7, 801, 803, 837, 842, 844, 846-7, 850, 3249, 3250.

Section D. *Pendulous and Loose Bodies in Joints.*

953. A knee-joint, in which there was a loose cartilage. The articular cartilage has been removed from the greater part of the patella; the portions near the borders alone remain. The cartilage of the external condyle of the femur has been removed to a similar extent; and the surfaces of bone thus brought into contact, and rubbed against each other in the movements of the joint, are hardened, polished, and worn down in parallel grooves, as if they had been chiselled. The remains of the articular cartilage on both bones are thin, and in many places degenerated into a soft fibrous substance. Around their borders the bones are thickened, and beset with projecting osseous plates and nodules. At the upper part of the patella, two of these nodules are of considerable size, and are referred to by Mr. Hunter, in the following case, as offering some explanation of the occurrence of loose bodies in the joints.*

“ In 1759, I stripped the bones of an old woman that died in St. George’s Hospital. I knew nothing of her history. In the stripping I observed many exostoses, especially upon the vertebræ. In taking off the flesh about the knee, and cutting into the capsule, there came out a stone, or bone, about the bigness of a nut, flattened. I opened the joint more, and extracted three more, lying under one of the heads of the gastrocnemius muscle at its origin. On turning down the patella, I saw that the cartilage was almost eroded off both it and the end of the femur, in parallel grooves, and upon the upper edge of the patella, close to the cartilaginous surface, there was an exostosis, which was broad and thin, shooting up under the tendon of the rectus, &c. This was partly divided into two, and both seemed to have been broken from the patella, and closely united by a ligamentous substance. The inner surface of the joint was ragged, and the synovia thick, and in some parts seemed to be mixed with matter.

“ I examined the joint of the ankle, and observed a piece of bone about the bigness of a pea within the cavity of the joint, but attached to the ligament of the joint by a strong ligament: however, it was loose, so as to be moved from side to side. Both these I have prepared.

“ The other knee was much in the same condition, besides which there were three small ones on the inside of the tendon of the popliteus muscle, just like maggots, and were attached to the tendon by membrane. This last I have likewise prepared, and have put one of the bones with it into the spirits.

“ These explain those cases in surgery where we find a moveable cartilage or bone in the joint of the knee.

“ She had two stones in the gall-bladder; one very large, the other smaller, which

* See, also, on this point, vol. i., p. 142.

was at the fundus, and had two smooth sides, which had rubbed upon the end of the great one, for it had a similar smooth end."—*Hunterian MS.* 'An Account of the Dissections of Morbid Bodies,' p. 70, No. 54.

The characters of the disease, so far as they are exhibited in the preparation, show that this was a case of fibrous degeneration of the articular cartilages, followed by removal of portions of the diseased structure, and hardening and polishing, or, as it has been called, *eburnation*, of the surfaces of the bones thus exposed and subjected to mutual friction. The loose bodies found in joints may be sometimes portions of bone or cartilage, which have been broken off; but there is not any evidence that those found in this case had such an origin. Probably, they were similar, both in structure and in mode of growth, to those formed in the two following specimens, in both of which there is a similar chronic disease of the cartilages and other tissues.

954. A knee-joint, to the walls of which many pendulous masses of bone and cartilage are attached. The extremities of both the femur and the tibia are greatly enlarged, especially by the heaping up of bone, in large nodulated masses, around the borders of their articular surfaces. This formation of new bone has taken place, chiefly, upon the outer condyle of the femur and the corresponding surface of the tibia, from both of which, also, nearly all the articular cartilage, after fibrous degeneration, has been removed, leaving the subjacent bone smooth and hard. The same changes, in a less degree, have affected the inner condyle of the femur, and the rest of the articular surface of the tibia. The pendulous bodies are between fifteen and twenty in number: they are all attached by one of their surfaces, or by portions of tough fibrous tissue, to the walls of the joint, or to the masses of bone around its borders. They are irregular in form and size, varying from half an inch to nearly two inches in their diameter; their surfaces are nodulated, and, for the most part, osseous; but present isolated portions of substance like semi-transparent bone-cartilage. They lie in various parts of the joint, and some small ones at the back appear to have formed externally to it. The fibrous tissues around the joint are all thickened, and strengthened with bands supporting and connecting the several pendulous growths.

Presented by William Lawrence, Esq.

955. A knee-joint, in which are two small growths of, apparently, cartilaginous and osseous substance. The largest of them, attached to the crucial ligaments, has an oval outline, measures nearly an inch in its greatest

diameter, is flat on its lower, and very convex on its upper, surface. By friction and constant pressure it had worn for itself a deep cavity, with hard grooved walls, in the posterior and lower part of the outer condyle of the femur: in this cavity it lay embedded, and apparently immoveable. Another pendulous body of small size, and irregular in form, is attached near the preceding; and a third, which is intermediate in size, and presents on its surface distinct nodules of cartilage, is fixed to the synovial membrane just below the patella. The greater part of the articular cartilage has been removed from the surfaces of the bones; what remains is thin, and in parts, especially on the middle of the patella, cracked, fibrous, and shreddy.

From the Museum of Sir A. P. Cooper.

956. The lower end of a humerus, on which, in the posterior fossa between the condyles, are three pendulous masses of bone and cartilage. One of them is attached by a slender pedicle, the other by a broad base; the synovial membrane appears to be continued over both. Some flattened nodules of new bone are attached to the corresponding anterior surface of the humerus: its cartilage appears healthy.

Presented by Sir William Blizard.

957. Section of a small loose cartilage, removed from the knee-joint. Its surface is flat, with numerous grooves and depressions; its texture appears to be uniform.

The removal of the cartilage by incision into the joint was followed by severe inflammation and suppuration; but the patient recovered.

Presented by Joseph Swan, Esq.

Specimens of Pendulous and Loose Bodies in the Joints in other parts of the Museum:—

Nos. 318-9, 469, 470, 509, 510, 3343.

Section E. *Gouty and other Unorganized Deposits in Joints.*

958. A carpus, with white, powdery, gouty deposit on the articular cartilage of the trapezium. Some of the other cartilages are thinner than is natural.

Hunterian.

959. The proximal end of the first phalanx of a finger, with gouty deposit on its articular cartilage. *Hunterian.*

960. Parts of a wrist and hand, with several of the joints laid open, to show thin layers of gouty deposit upon their articular cartilages. In some parts, also, a similar material is deposited in the tissues around the joints.

From the Museum of George Langstaff, Esq.

961. The other wrist and hand of the same patient, similarly diseased. It has been dried after the injection of its vessels.

The patient had cirrhosis of the liver, and died with empyema and pericarditis.

From the Museum of George Langstaff, Esq.

962. A knee-joint, with a thin layer of white gouty deposit covering nearly the whole of the articular cartilages of the femur and patella. A considerable quantity of the same material has been deposited on the adjacent parts of the synovial membrane. The cartilages themselves are thin, greyish, and in some places rough and nodulated. *Hunterian.*

963. Part of a tarsus, with very thin layers of gouty deposit on the proximal articular cartilages of the os cuboides and os naviculare. *Hunterian.*

964. Parts of a carpus and metacarpus, with gouty deposits on the back of the metacarpal bones. Parts of two small cavities, like abscesses, are also shown, in which, probably, gouty matter was contained: they do not communicate with any of the joints. *Hunterian.*

965. A thumb, in which the articular cartilages of its metacarpal joint have gouty deposits, are irregularly thinned, and have had their margins removed. Over the articulation of the phalanges is a cavity, which contained gouty matter, and communicated with the joint. *Hunterian.*

SERIES XIII.—Section F. *Osseous Anchylosis.*

966. The bones of a face. On the left side, complete osseous union has taken place at the temporo-maxillary articulation. A vertical section through the upper part of the ramus of the jaw and the temporal bone at the base of the zygoma, on this side, has exposed an uninterrupted surface of apparently healthy cancellous tissue, bounded on each side by a compact wall, and continuous with the original cancellous tissue and diploe of the bones. On the right side, the form of the bones in the corresponding joint is altered. The middle part of the condyle has been removed, and in place of the slight convexity of its articular surface there is a deep transverse concavity, occupied with a growth of bone projecting from the middle of the glenoid cavity, and forming a new joint with it. The whole of the lower jaw is atrophied: all its teeth have been removed except the two middle incisors, and these project unnaturally from their alveoli, filling up a gap left by the removal of the corresponding incisors of the upper jaw. The tissue of the upper jaw is thin, light, and spongy.

The anchylosis had existed for more than fifty years.

From the Museum of John Howship, Esq.

967. The last two phalanges of a little finger, closely and smoothly united by bone. There is but a trace of their original outlines.

The anchylosis was the consequence of a whitlow, which had existed many years before the removal of the finger.

From the Museum of John Howship, Esq.

968. The bones of a finger, in which all the articulations are closely and smoothly united by bone. The first two phalanges are in the half-bent position; the last is turned towards the side, at nearly a right angle to the second.

The changes were the consequence of whitlow.

From the Museum of Robert Liston, Esq.

969. The bones of a knee-joint, closely united by osseous anchylosis. The union of the inner condyle of the femur with the tibia is complete, and extends over the whole of their corresponding surfaces; that between the outer condyle and the tibia is effected by several short but broad columns of bone, extending from one to the other, and leaving passages between them. In the outer condyle, and in the corresponding part of the head of the tibia, is a deep ulcerated cavity. The tibia and fibula are drawn outwards, and a little backwards. The patella is anchylosed by bone to the front of the outer condyle of the femur, and its anterior surface and borders, like the surfaces of all the bones near the joint, are covered with nodules and large spicula of new bone. The texture of all the bones is light and spongy.

From a man forty-five years old. Inflammation of the joint had been produced by a violent injury, and the limb was amputated.

From the Museum of Robert Liston, Esq.

970. The bones of a tarsus, and three metatarsal bones, all united by bone, which both connects their substance and extends smoothly and continuously over their dorsal and plantar surfaces, and presents in some places a fasciculate appearance, as if the ligaments were ossified. The fifth metatarsal bone has been removed, and the corresponding articular surface of the cuboid bone is superficially ulcerated. The sole of the foot has lost its natural arch, but the several bones are not displaced from their mutual relations.

Hunterian.

Specimens of Osseous Anchylosis in other parts of the Museum :—

Nos. 384, 466, 573-4-5, 580, 878, 3325-6-7, 3344 to 3398.

Specimens of Anchylosis by other than Osseous Tissue :—

Nos. 465, 699, 700, 855, 899, 937-8.

SERIES XIII.—Section G. *Dislocation after Disease. (Spontaneous Dislocation.)*

971. An elbow-joint, and a metacarpal bone. After long-continued disease of the elbow-joint, the radius and ulna have been dislocated backwards and inwards. The sigmoid cavity of the ulna rests on the internal condyle of the humerus, and the radius on the trochlea, with its head projecting backwards nearly as far as the olecranon. The joint is bent at a right angle, and all the tissues around it are hardened and consolidated. The articular cartilage of the distal end of the metacarpal bone is in part ulcerated, and its shaft appears to be surrounded with granulations.

From a boy, in whom the disease was the consequence of injury inflicted by swinging him on his extended arms.

From the Museum of Robert Liston, Esq.

972. An elbow-joint. All the articular cartilages have been removed, probably after fibrous degeneration. The surfaces of the subjacent bones are uneven, hardened, and in parts nodulated, and covered with thin fibrous membrane. They are all much enlarged, and new bone is accumulated in small nodules around their articular borders. The head of the radius is especially enlarged and mis-shapen: it is dislocated forwards, and rests on the front of the outer condyle. The ulna appears to have been moved outwards, but this appearance is due, in great measure, to the enlargement of the internal condyle of the humerus. A strong and thick capsule of fibrous tissue surrounds the whole joint.

Presented by Joseph Swan, Esq.

973. A vertical section of a knee-joint. The articular cartilages of the femur and tibia, and the greater part of that of the patella, have been removed. The surfaces of the exposed bones, especially the femur and patella, are slightly ulcerated. The epiphyses of the femur and tibia appear hardened: their shafts are extremely atrophied. The synovial membrane is thick-

ened. The tibia is drawn far backwards, with considerable elongation of the ligamentum patellæ. The posterior part of the articular cavity is closed with lymph and the thickened synovial membrane.

Presented by Sir William Blizard.

974. A vertical section of a child's knee-joint. All the articular cartilages have been removed: the subjacent bones are superficially ulcerated, and in their whole texture light and thin. In the shafts of the tibia and femur, the cancellous spaces of the medullary tissue are wide, and bounded by very long slender fibres of bone. The axes of the femur and tibia form an acute angle, the tibia being drawn backwards almost out of contact with the femur. Portions of glass are placed in several ulcerated passages leading from the joint through the integuments around it.

From the Museum of George Langstaff, Esq.

Specimens of Dislocation by Disease in other parts of the Museum :—

Nos. 384, 571, 742, 855, 932-3, 941, 3320-1-2-3-5-6.

SERIES XIV.—INJURIES AND DISEASES OF THE VERTEBRAL COLUMN.

THE general structure and relations of the Vertebral Column impart such peculiar features to many of the injuries and diseases to which it is liable, that it appears proper to group together all the specimens in which it is affected, though, in a more general and exact pathological system, they might be dispersed among the diseases and injuries of bones and joints. The specimens composing the following series are arranged nearly in accordance with the plan adopted in the arrangement of the specimens in the 12th Series.

Atrophy.

975. Five dorsal vertebræ, from which nearly all the compact osseous tissue has been removed. Except at their upper and lower margins, the bodies consist of only very light cancellous tissue, and the surfaces of the spinous processes, arches, and other parts present numerous small apertures, from which, by gradual thinning and atrophy, the superficial compact layer has been removed. The remaining cancellous tissue is very light, dry, with very wide spaces and portions of fatty matter in it. There is not any distortion of the spine.

From the Museum of Robert Liston, Esq.

976. Five lower dorsal vertebræ, the bodies of which were absorbed to a considerable depth, anteriorly and laterally, in consequence of the pressure of an aneurismal sac. The intervertebral cartilages appear healthy, and project from the cavity formed by the absorption of the vertebral bodies.

Presented by Sir William Blizard.

Fracture and Dislocation.

977. The first three cervical vertebræ of a gentleman, who was killed by being thrown from his horse and falling on his head. The posterior segment of the ring of the atlas was broken off, and the spinal chord and its dura mater were lacerated. There is not any displacement of the vertebræ; and the transverse ligament is perfect, and retains its usual relations with the odontoid process.

From the Museum of George Langstaff, Esq.

978. The upper part of a vertebral column, with the corresponding portion of the spinal chord. A fracture extended through the right halves of the arches of the third, fourth, and fifth cervical vertebræ, and through the body of the fifth, which was so displaced that the spinal chord was firmly compressed by it.

The patient, a man between fifty and sixty years old, fell down stairs, and remained for some time as if dead. Half an hour after, his arms and legs were completely insensible and motionless, and he had great difficulty of breathing. He spoke in a whisper, and had much pain when the cervical vertebræ were pressed.

He died two hours after the fall. Much fluid was found within the dura mater of the spinal chord, but no effused blood either within or without it.

The case is further related in Mr. Swan's "Treatise on Injuries and Diseases of the Nerves," p. 223.

Presented by Joseph Swan, Esq.

979. The last four cervical vertebræ, with the corresponding part of the spinal chord exposed by the removal of portions of their arches. The right inferior articular process of the fifth cervical vertebra is dislocated forwards, a portion of the inferior part of its body is broken off, and the inter-vertebral fibro-cartilage beneath it is torn through. The spinal chord is compressed at the seat of injury.

980. The last four cervical vertebræ of an adult. The fibro-cartilage between the fifth and sixth vertebræ is torn through, and the left superior articular process of the sixth is dislocated backwards, with fracture through the pedicle by which it was attached to the body.

Presented by Sir William Blizard.

981. A sacrum, with the last two lumbar vertebræ. There has been a comminuted fracture of the sacrum. One chief line of fracture passes transversely across the junction of the first and second sacral vertebræ, and communicates with other fractures by which the upper angles of the first were broken off. The other chief line passes downwards from the first sacral foramen on the left side, through the whole length of the body of the sacrum, and through the first portion of the coccyx. There has not been any process of union.

The patient, a lad eighteen years old, fell from the top of Holyrood Palace, a height of 76 feet, and in addition to the injuries exhibited in the preparation, received a compound dislocation of the ankle, with fracture of the astragalus, a dislocation of the humerus, and concussion of the brain. The only sign of the injury of the sacrum was severe pain in the back and loins. After death, an abscess was found extending through the soft parts over the sacrum and last lumbar vertebræ, and communicating with another large collection of pus within the pelvis.

The case is recorded in the "London Medical Gazette," vol. v., p. 508. January 16th, 1830.

From the Museum of Robert Liston, Esq.

982. The last three dorsal and the first two lumbar vertebræ of an adult. The last dorsal vertebra has been fractured vertically through the middle of its body, and appears, besides, to have been crushed at its anterior part. The several portions are united by bone, but imperfectly. A considerable angular curvature is formed, in consequence of the loss of substance of the anterior part of the body of the vertebra, and the fractured posterior part projects far into the vertebral canal.

From the Museum of Robert Liston, Esq.

983. Three lumbar vertebræ, from one of which (probably the third lumbar) a portion was broken off, including the spinous process, the arch, and the two inferior articular, or oblique processes—the plane of fracture having passed, on each side, through the junction of the arch with the superior articular and the transverse process. The portion thus detached has dropped down a little, and its articular processes are freely moveable upon the superior articular processes of the vertebra next below it, and upon two shallow fossæ which have been hollowed out on the upper margin of the arch of that vertebra. A small quantity of new bone has been formed about the fractured parts; but in other respects all the vertebræ are healthy.

The person from whom the specimen was taken was a strong and well proportioned man, about fifty years old, but his history was not known.

Presented by John Jessie, Esq.

984. The last two dorsal and the first four lumbar vertebræ of a man who fractured his spine nearly a year before death. The fracture seems to have implicated chiefly the first lumbar vertebra, the body of which is much reduced in size, and covered at its anterior part with a layer of new bone, which extends over parts of the intervertebral cartilage above and below, and connects the remains of this vertebra with the bodies of those adjacent to it. Behind, a portion of the body of the first lumbar vertebra has been forced into the spinal canal, nearly separating the upper from the lower part of the spinal chord. The opposite internal surfaces of the dura mater are, at this part, in contact; its external surface is shreddy, and covered with lymph.

The patient, an athletic man, 28 years old, received the injury from a fall of chalk and flints, which buried him several feet beneath their surface. He was speedily dug out, and an angle in the lumbar region of the spine, with complete paraplegia, was observed directly afterwards. He was unable to discharge his urine, with which, for some time after the accident, purulent matter was generally mingled: at the end of a month the integuments over the sacrum sloughed, but by changing his posture this evil was arrested, and the healing of the parts was complete in about four months. Six months after the accident, the patient had regained the natural form and use of his spine, and complete control of the discharge of fæces and urine. His general health also was fully restored, and the paralysis of his lower extremities appeared to be the only remaining consequence of the injury he had sustained. But sloughing took place on the tuberosity of the ischium, apparently in consequence of his being in the habit "for some time of letting himself down stairs, step by step;" it was accompanied with partial necrosis of the tuberosity and the formation of a large abscess; and death ensued from the effects of this disease just ten days less than a year after the fracture of the spine.

A further account of the case is given by Mr. Harrold, in 'The Medical and Physical Journal,' vol. xxv. p. 201, and vol. xxvi. p. 371. London, 1811.

Presented by Thomas Harrold, Esq.

985. A sacrum, with the coccyx and last two lumbar vertebræ. The lower end of the sacrum was fractured, and the coccyx dislocated to the right side, by a fall from a considerable height. Several of the fractured portions of the sacrum exfoliated, and the part from which they were removed is smoothly healed. The first portion of the displaced coccyx is firmly fixed by bone in its new position, directly below the last sacral foramen on the right side.

The patient was twenty-five years old. Immediately after the fall he lost the use of his legs, and the power over his bladder and rectum. Abscesses formed near the loins and the end of the sacrum, and at various times portions of bone were discharged from them. He recovered for a time the power of controlling the passage of retaining his urine and fæces, but his health declined, and he died with signs of inflammation of the spinal chord. Pus was found after death in the pia mater of the brain. The spinal chord was dark and soft, and its dura mater seemed disorganized. The sacral nerves appeared dark and diminished in size. All the lower part of the sacrum was deprived of its periosteum.

From the Museum of George Langstaff, Esq.

985A. The last two dorsal, and the first three lumbar, vertebræ of an adult spine. The greater part of the body of the second lumbar vertebra appears to have been absorbed after being fractured, crushed, and, to a

slight extent, dislocated laterally. New bone, accumulated about its margin, has united it with the body of the vertebra above it, and with other portions of new bone thence proceeding. The posterior part of the remains of the fractured vertebra projects far into the spinal canal.

The patient, a collier, was thrown through several yards against the side of a mine, in an explosion of fire-damp. He was taken up insensible, and severely scorched: the lower part of his back was bruised, but no sign of paralysis appeared till after four days, when he observed numbness and partial loss of power in the lower extremities. At the end of nine months, however, these ceased, and he resumed his employment; but, in the next week, was killed by a mass of coal falling on his chest.

Presented by J. L. White, Esq.

986. The arches and spinous processes of seven of the lower dorsal vertebræ. A bullet, irregularly flattened, is fixed on the inner surface of the arch of the ninth dorsal vertebra. Some new bone is deposited around its place of attachment; and parts of the adjacent ribs are ankylosed to the transverse processes of the wounded vertebra, and the vertebra above it.

“ Thomas Cockcroft, thirty-four years old, a stout, healthy, and robust man, was, by mistake, wounded at Halifax (Yorkshire) with a pistol-ball on the left side of the spine, just below the scapula, on the morning of the 26th of July, 1815. Immediately upon receiving the wound he fell to the ground, and when assisted to be raised up, he declared that his back was broken. From that period until his death, which took place on the 11th of February, 1827, he laboured under complete paralysis of the inferior extremities.

“ From the time of receiving the accident he was principally confined to bed; his bowels were always confined, and his stools and urine came away involuntarily. He frequently complained of great pain in his right side and lower extremities, which he called ‘bone-pain,’ although totally insensible to their being handled. At one time some bricks heated in boiling water were ordered to be applied to the soles of his feet, to keep up a natural warmth in the extremities; but his wife heated the bricks in an oven so effectually, that, after they had been applied to the feet a while, they were found firmly adhering to them, and the soles of both sloughed off: however, they got perfectly well.

“ His appetite continued good until a few weeks before his death, when it began to fail, and he was seized with diarrhœa. About a month before his death he had a severe attack of erysipelatous inflammation in the right leg, from which he recovered; but, a fortnight before his death, a fresh attack of inflammation seized both thighs, which resisted every remedy adopted, and ended fatally.

“ His body was not much emaciated, and nothing remarkable was found on examination of the thoracic and abdominal viscera, except that the spleen was enlarged and

firm. The spinal chord, at the part on which the bullet pressed, was considerably diminished in size."

Presented, with the foregoing history of the case, by Dr. Moulson.

Ulceration.

987. Six lower dorsal and two upper lumbar vertebræ, with some of the adjacent parts. The whole of the body of the eleventh, and great parts of those of the tenth and twelfth dorsal vertebræ, have been destroyed by ulceration, and the remains of the two latter coming together, a considerable angular curvature has been produced. The bodies of all the other vertebræ are superficially ulcerated; the last dorsal intervertebral substance is destroyed; and the remains of the periosteum and other tissues in front of the spine are thickened and separated, as if matter had been collected beneath them. The portion of the aorta which is preserved appears to have been bent.

Presented by Sir William Blizard.

988. Nine lower dorsal and two upper lumbar vertebræ, with the surrounding parts. The bodies of the tenth and eleventh dorsal vertebræ have been, in great part, destroyed by ulceration, and the spinal canal is exposed from the front. A large abscess, which formed in front and by the sides of the column, appears to have been confined by the thickened periosteum and other tissues, and to have extended beneath them up to the third dorsal vertebra, and down to the second lumbar. The bodies of all the vertebræ included in this extent are superficially ulcerated, except that of the ninth dorsal, which (like the remains of the bodies of the tenth and eleventh) is covered with a dense tissue of new formation, like tough false membrane. Parts of the last dorsal and first lumbar vertebræ are similarly covered. No curvature of the spine appears to have existed.

989. A vertical section of the lumbar and part of the dorsal portion of a child's vertebral column, with the spinal chord. The bodies of the twelfth dorsal and first lumbar vertebræ, with their intervertebral cartilage, are wholly

removed, and those of the eleventh dorsal and second lumbar are in great part removed, by ulceration. The bodies of the other lumbar vertebræ appear to contain tuberculous matter in their cancellous spaces. The rest of the intervertebral cartilages, and the other adjacent tissues, are healthy. The parts above and below the ulcerated vertebræ coming together, a considerable angular curvature of the spine is produced; but, through the enlargement of the spaces between the arches of the vertebræ, the spinal canal is not diminished in its calibre. The spinal chord and the roots of the nerves appear healthy. *Hunterian.*

990. The middle of the dorsal portion of a vertebral column, with the spinal chord, and other adjacent parts. A cavity has been formed in the substance of the bodies of three of the vertebræ, one of which is almost entirely removed. The interior of this cavity is smooth and distinctly circumscribed; it contained pus, and had not any external aperture, its walls, where the bone was destroyed, being formed of the thickened and indurated tissues in front of the column. By the approximation of the remains of the bodies of the diseased vertebræ the spine is curved so as to form nearly a right angle. But the vertebral canal is not diminished in size opposite the apex of the angle, nor is the spinal chord compressed; for the spaces between the arches of the vertebræ are increased, and there is a thick layer of adipose tissue on each surface of the chord where it is most bent.

The patient was a young woman. The angular curvature of the spine had existed two years, without impairment of the nervous functions, when she died with disease in the chest and abdomen.

From the Museum of Robert Liston, Esq.

991. The eight lower dorsal, and the three upper lumbar, vertebræ of a child, with the adjacent parts. Nearly the whole of the bodies of the last dorsal and first lumbar, with part of that of the eleventh dorsal, vertebræ have been removed by ulceration, and the approximation of the vertebræ above and below has produced a considerable angular curvature. All the other dorsal vertebræ are deprived of periosteum, and superficially ulcerated. On the bodies of several of them, also, are small cup-shaped ulcerated

cavities, with smooth well-defined margins; and in these cavities, as well as within some of the vertebræ, are appearances of tuberculous matter. The intervertebral cartilages from the sixth to the eleventh dorsal inclusive are almost wholly destroyed. The spaces left by their removal between the bodies of the vertebræ contain only thin and loose lamellæ of their tissue, except at the posterior part, close by the vertebral canal, where, in some of the spaces, may be seen a portion of the intervertebral substance, of normal thickness, presenting anteriorly a sharp, abrupt, and smooth ulcerated edge, but, apparently, little altered in its texture. There are several small cavities in the thickened tissues about the sides of the vertebræ and the heads of the ribs, some of which are filled with tuberculous matter.

Presented by Sir William Blizard.

992. Seven lower, probably the lowest, dorsal vertebræ, with some of the adjacent parts. In the body of the first of the vertebræ is a deep and large excavation, with which several of smaller size, indicated by incomplete partitions, have coalesced. The walls and margins of the excavation are smooth, well defined, and lined with a thin layer of false membrane, behind which is an appearance of small masses of tuberculous matter. The body of the second of the vertebræ is superficially ulcerated, and has one small deep cavity in its front part; that of the third is similarly ulcerated, and its remains are filled with small granulated masses of tuberculous matter; the bodies of the fourth and fifth are almost wholly removed by ulceration, but in their remains, as well as in those of the sixth and seventh, which are less extensively ulcerated, nearly all the cancellous spaces are full of tuberculous matter. The intervertebral cartilages are nearly all removed: but of some of them, portions, of the natural thickness, remain next the spinal canal, and of some, the superior and inferior layers are still firmly fixed to the bodies of the contiguous vertebræ. The ulceration, therefore, appears in this, as in the previous case, to have made its way from before backwards, and from the middle towards the upper and lower layers of the intervertebral substance. In neither case is there any curvature of the spine at the part from which the fibro-cartilages are removed.

Presented by Sir William Blizard.

993. The last three dorsal, and the first four lumbar, vertebræ of an adult. The intervertebral fibro-cartilage between the first and second vertebræ has been removed by ulceration, and the adjacent parts of their bodies are ulcerated, and broken up into portions which are nearly loose. New bone has been formed on the margins of the bodies of these two vertebræ, and in smaller quantity, and irregularly, on those adjacent to them. Ulceration has also taken place, to a small extent, on the anterior part of the body of the third lumbar vertebra.

From the Museum of Robert Liston, Esq.

994. Four lumbar vertebræ. The adjacent surfaces of the bodies of two of them present deeply ulcerated cavities, but their margins are unaffected, so that when viewed from the front they appear healthy, except for the small quantity of new bone deposited upon them. The ulcerated surfaces are formed of thickened cancellous tissue and a small quantity of new bone; and one of the cavities opens posteriorly into the spinal canal. The intervertebral substance has been removed from between these two vertebræ, but that between the others appears healthy.

From the Museum of Robert Liston, Esq.

995. The last two lumbar vertebræ and the sacrum of a man forty-five years old. The body of the last lumbar vertebra has been almost entirely destroyed by ulceration; its remains are fixed to the vertebra above it, and to the sacrum, by bridges of new bone attached to their several borders. The intervertebral substance appears healthy. The upper half of the sacrum is in many parts superficially ulcerated; and its lower half is so deeply and extensively ulcerated, that, in maceration, it has fallen into small irregular portions.

The chief signs of the disease were severe pain in the legs and lower part of the back. At last the patient had diarrhœa, and died with extensive ulceration of the large intestines.

From the Museum of Robert Liston, Esq.

996. The last four dorsal, and the first four lumbar, vertebræ of a middle-aged man. The borders of the last dorsal and first lumbar vertebræ are almost

entirely destroyed by ulceration. The remaining portions of them have the aspect of healthy cancellous tissue, and are approximated, so that there is a considerable angular curvature of the spine. The bodies of the vertebræ next above and below them are superficially ulcerated, and covered with a small quantity of new bone. The arches and processes of all the vertebræ are healthy; but the whole tissue of the spine is light and dry.

From the Museum of Robert Liston, Esq.

997. The six lower dorsal, and the two upper lumbar, vertebræ of a child. After the destruction, by ulceration, of the greater parts of the bodies of the three lower dorsal and the first lumbar vertebræ, their remains were approximated, and are completely and firmly united in one mass of rather hard bone, in which a part of one of the intervertebral substances is imbedded. There is a very acute angular curvature opposite the seat of the disease, but the spinal canal, though somewhat shortened, is increased in diameter.

From the Museum of George Langstaff, Esq.

998. A part of the occipital bone, with the first three cervical vertebræ, of a child twelve years old.

From the Museum of George Langstaff, Esq.

The following account of the case is recorded by Mr. Lawrence in his observations "On Dislocations of the Vertebræ," in the *Medico-Chirurgical Transactions*, vol. xiii. p. 400, London, 1825.

"At the age of five or seven, a child became the subject of an illness supposed to be hydrocephalus. After it had existed for some time, a swelling took place in the side of the neck, obviously containing fluid, and this slowly increased to a considerable magnitude, so that its contents must have amounted to several ounces. Pressure on this swelling affected the brain, producing a state of coma. It was supposed at this time that the fluid in the neck communicated with that suspected to exist in the ventricles of the brain. The child used to move the head cautiously and slowly, supporting it with the hands at the sides. After a long continuance the symptoms slowly subsided, and at last entirely disappeared, together with the swelling of the neck. At no period of the complaint was there any interruption or diminution of sensation or voluntary motion, and the recovery of health and activity was complete, the child being able to walk or run, and engage in the active sports suited to its age. There was nothing to attract particular notice in the position of the head. After some time had elapsed, disease came on in the lumbar vertebræ, attended with bending forwards of the spine and the formation of a large lumbar abscess. In consequence of this affection the child died at the age of twelve.

“ Examination.

“ The head was examined during the hottest part of last summer, and the brain had become so soft, that the changes produced in it by disease could not be ascertained. Mr. Wigan brought to me the basis of the skull, in which we were surprised at observing a considerable bony prominence standing up in the right side and front of the foramen magnum.

“ The projection in question was smoothly covered by the dura mater, and it was soon apparent that it must be the dentiform process of the second vertebra. When the soft parts had been completely removed by maceration, I found an extensive displacement of the occiput, atlas, and axis, and a firm consolidation of these bones in their new relative positions by the complete bony ankylosis of several articulations. The atlas is partially dislocated towards the left, and at the same time thrown a little forwards and upwards; hence the right and posterior part of its bony ring intercepts a considerable portion of the spinal canal. The middle anterior protuberance now corresponds to the left side of the basilar process; the extremity of the left transverse process projects three-quarters of an inch beyond those of the two following vertebræ, while the right transverse processes of those vertebræ project one-quarter of an inch beyond the corresponding one of the atlas. A considerable part of the right side of this bone has been destroyed by absorption; that is, the surfaces by which it is articulated to the occiput and atlas, a part of the transverse process, and that groove on which the right vertebral artery rested. The axis is completely dislocated from the atlas and occiput to the right, so that its left portion intercepts about one-third of the spinal canal, and the dentiform process projects by its whole length, into the cavity of the skull at the anterior part of the foramen magnum, close to the right anterior condyloid foramen.

“ In the natural position of the parts, the apex of this process is a little below the level of the occipito-atlantal articulation; here it is an inch above the same level, while its projection into the cavity of the skull is between five and six eighths of an inch. The lateral displacement is no less extensive, the measurement from the left anterior condyloid foramen to the middle of the basis of the dentiform process being seven-eighths of an inch, while the distance from the right foramen to the same point is only two-eighths. We cannot but be astonished at finding that the immediate pressure of this bony projection on the under surface of the medulla oblongata caused no paralytic affection, even when we allow for the very gradual manner in which it must have taken place. The course of the right lingual nerve and vertebral artery must have been greatly altered.

“ The bodies of the second and third vertebræ are displaced towards the right, so that a line drawn along their middle and continued upwards, would strike the right margin of the basilar process; and the small tubercle on the anterior arch of the atlas corresponds to the left side of those bodies.

“ The right occipital condyle, the remains of the right transverse process of the atlas, the inferior articular plane of the axis, and the right side of the basis of the dentiform process, are ankylosed, so as to form one solid bony mass.

"The left occipital condyle is partially anchylosed with the atlas; the left articular plane of the axis, its transverse process, and that of the third vertebra, are all consolidated with the partial anchylosis just mentioned. The articular processes of the axis and the third vertebra are anchylosed, the union extending on the left side as far as the bases of the spinous processes. The bodies of the axis and third vertebra are not anchylosed.

"The preternatural bony connections just enumerated are perfect, equalling in solidity the natural bony structure, so that the limits of the anchylosed bones are confounded. The bony texture is quite natural; there is no roughness of surface, no diminution of solidity, nor any appearance of caries.

"The dimensions of the vertebral canal at its commencement are greatly reduced by the extensive displacement of the atlas and axis. The antero-posterior diameter of the foramen magnum is in this case one inch and a half, the greatest measurement from side to side is one inch and a quarter. The diameter of the ring of the third vertebra, from side to side is seven-eighths of an inch, from front to back six-eighths. The measurement of the canal, between the displaced portions of the atlas and axis, is half an inch from before backwards, and five-eighths of an inch from side to side.

"The history and examination of this case clearly show that the opinion originally entertained of its being hydrocephalus was altogether erroneous, that the primary disease was an affection of the articulations, the fluctuating tumour in the neck being a chronic abscess consequent on that affection, while the spontaneous disappearance of the tumour is referable to the cessation of the irritation which caused it. The swelling bore the same relation to the vertebral disease that lumbar abscess does to disease in the lumbar region of the spine."

999. Part of the spine of a cartilaginous fish, probably a large Ray. It has been bent, in consequence of one of the vertebræ having lost a great part of its internal structure, and its two surfaces being on one side closely approximated. New bone has been formed in small quantity on the bodies of the diseased and the adjacent vertebræ. *Hunterian.*

Necrosis.

1000. The four lower lumbar vertebræ, with parts of a sacrum, and of a left ilium. Small portions of the body of the third lumbar vertebra were separated, and lay loose in a cavity between it and the upper part of the fourth. A portion of considerable size, in a state of necrosis, is enclosed

within this cavity, attached to the remainder of the body by only a small part of its surface. There are small superficial ulcerations on the anterior part of the body of the fourth vertebra, and on the side of the fifth, as well as on the upper part of the sacrum, and on the internal surface of the crest of the ilium. New bone has been deposited on various parts of the diseased vertebræ.

The patient had a lumbar abscess which pointed in the left groin and above the crest of the left ilium.

From the Museum of Robert Liston, Esq.

Specimens of Injuries and Diseases of the Vertebræ in other parts of the Museum :—

Atrophy, 121A.

Growths of Bone, 579, 580, 3367 to 3391.

Osseous Anchylosis, 3392 to 3398.

Ulceration, 109, 3399 to 3406.

Tumours, &c., 796, 832, 851.

Lateral Curvature, 3407 to 3416.

Antero-posterior Curvature, 3417-8.

Angular Curvature, 3419 to 3422.

END OF VOL. II.

