of London should acknowledge the labours of him who had most effectually contributed to this end.

Henderson's results seemed sufficiently convincing, but they depended upon determinations of the absolute place of α Centauri. The experiences of the skilful astronomer Brinkley at Dublin were still fresh in the minds of astronomers. He had arrived by similar though less perfect means at results like those of Henderson; but his results had been proved to be fallacious, though the causes of their being so still remain somewhat inexplicable. In the case of Struve's observations the weight of evidence which he produced and the excellence of his method were admitted, but men were not prepared by experience for accepting as accurate the minute changes of angle which Struve had to measure—nor, I am bound to admit, was the proof afforded by Struve's series of observations so entirely convincing as that afforded by the series of Bessel. Therefore to Bessel the well-earned medal was given, but the labours of Struve and Henderson received high and honourable mention. I quote from the speech of Sir John Herschel in awarding that medal. He says of Henderson's researches on α Centauri:—

"Should a different eye and a different circle continue to give the same result, we must of course acquiesce in the conclusion; and the distinct and entire merit of the *first* discovery of the parallax of a fixed star will rest indisputably with Mr. Henderson. At present, however, we should not be justified in anticipating a decision which time alone can stamp with the seal of absolute authority."

So much for Sir John Herschel's officially expressed opinion. I can state now, and as Henderson's successor I do so with pride and pleasure, that a different eye (that of his able and sympathetic successor, Sir Thomas Maclear) fully confirmed Henderson's result with another circle; and further, that Henderson's result has been still further confirmed by additional researches of which I shall presently speak.

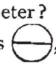
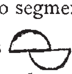
I must now pass over briefly the history of succeeding researches, and indeed it has been so admirably and so recently told within these walls by Dr. Ball that it is quite unnecessary I should enter upon it in detail. The most reliable values arrived at for the parallaxes of the stars of the northern hemisphere are given in the following table, and to these results I shall afterwards refer:—

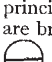
TABLE I.—*Parallaxes of Stars which have been determined in the Northern Heavens with considerable Accuracy*

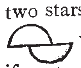
	Magnitude	Proper motion	Parallax
		"	"
61 Cygni	6	5·14	0·50
Lalande 21185 ...	7¼	4·75	0·50
α Tauri	1	0·19	0·52
34 Groombridge ...	8	2·81	0·29
Lalande 21258 ...	8½	4·40	0·26
O.Mg. 17415 ...	9	1·27	0·25
σ Draconis	—	1·87	0·25
α Lyræ	1	0·31	0·20
p Ophiuchi	4½	1·0	0·17
α Bootis...	1	2·43	0·13 ?
Groombridge 1830.	7	7·05	0·09
Bradley 3077 ...	6	2·09	0·07
85 Pegasi	6	1·38	0·05

The recent researches referred to in the title of this evening's lecture are some investigations which, in conjunction with a young American friend, Dr. Elkin, who was my guest for two years, I have recently carried out at the Cape of Good Hope.

The instrument employed was a heliometer—my own property—the good qualities of which I had previously tested at Mauritius in 1874 and at the Island of Ascension in 1877.

Now what is a heliometer? It is a telescope of which the object-glass is divided thus , and the two segments so formed can be moved with respect to each other, thus  and .

Here is a model which has been constructed to illustrate the principle of the instrument. You see that when the two segments are brought into what we may call their natural position, thus , that a heliometer differs in no way from an ordinary telescope—its divided lens produces a single image of a point of light, as will be evident from the image of the single artificial disk now on the screen. In optical language, the optical centres of the two segments are in coincidence, and so the images produced by each segment of the lens are in coincidence. But now, if the segments are separated, either segment produces a separate image of the artificial star, and the separation of the images is proportional to the separation of the segments.

Now, to illustrate how this instrument is used in observation, let there be two artificial stars—*a* and *b*. When the optical centres of the segments are in coincidence, we have on the screen—or in the field of view of the telescope—the images of these two stars. By separating the optical centres of the segments thus  we obtain double images of each of the stars *a* and *b*. Now if we turn the direction of the line of motion of the divided segments parallel to the direction of the stars *a* and *b*, and if we separate the lenses sufficiently we can make one of the images of the star *a* coincide with one of the images of star *b*. Similarly if we cross the segments we can bring the second image of star *b* into coincidence with the second image of star *a*, and if we have finely divided scales attached to the slides by which the segments are separated we can read off, in terms of these scales, the amount of this separation, and this separation is obviously twice the angle between the stars *a b*.

There is now upon the screen a photograph from a drawing illustrating the arrangements by which the segments of my heliometer are moved, and showing the scales by which the amount of the movement is measured; and these scales are read off by a powerful microscope from the eye end of the telescope, as in the photograph of the instrument now on the screen.

There is now on the screen a photograph of a drawing of the most perfect heliometer in the world, recently made by Messrs. Repsold of Hamburg for the Observatory of Yale College, New Haven, U.S. That instrument is now under the charge of my young friend, Dr. Elkin, of whom I have already spoken. If then we wish to observe the angle between two stars, it is only necessary to separate the segments of the object-glass by the required amount, to rotate the tube till the line of section of the object-glass is in the line joining the stars, to direct the axis of the telescope to a point in the heavens midway between the two stars under observation, and then we shall find in the field of view the two stars the angle between which we wish to measure. Then by slow and delicate changes in the distance of the optical centres of the segments, whilst the images of the stars are made to pass and repass through each other—thus—we are able to exactly adjust the angular distance of the segments to correspond truly with angular distance of the stars.

(*To be continued.*)

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Museums and Lecture-Rooms Syndicate have recommended the immediate erection of a new lecture-room for physiology, with large additions to the rooms for practical physiology and to the work-rooms adjoining the Comparative Anatomy Museum, at an estimated cost of 7500*l*. These are to be carried along Corn Exchange Street. A work-room for the large class of Elementary Biology is also recommended to be built as an additional story above the Museum of Mineralogy, at a cost of about 2500*l*. It is also recommended that 1000*l*. be laid out in the purchase of microscopes.

The Board of Biology and Geology have modified their report respecting demonstrators and lecturers in Animal Morphology, on learning that the General Board of Studies cannot support their former proposals owing to the financial state of the University. They now ask for a lecturer on Vertebrates at 100*l*. and one on Invertebrates at 50*l*., together with a demonstrator at 150*l*., to be appointed by the Senior Lecturer in Animal Morphology.

The Rev. J. Venn, of Gonville and Caius College, has been approved for the degree of D.Sc.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 15.—"Some Experiments on Metallic Reflection. No. V. On the Amount of Light Reflected by Metallic Surfaces. III." By Sir John Conroy, Bart., M.A. Communicated by Prof. G. G. Stokes, Sec.R.S.

On Silvered Glass Mirrors.—The first set of photometric determinations were made with a silver film deposited on a flat and well-polished glass plate 76·5 mm. long and 51 mm. wide.

The glass plate was weighed before and after being coated with silver, and the weight of the film was found to be 0·0035 grm.; assuming the density of the silver to be 10·62, that being the value for silver finely divided by precipitation given in "Watts's Dictionary," vol. v. p. 277, the thickness of the film calculated from the area and weight was 0·00008447 mm.

The film appeared opaque by ordinary daylight, but when examined with sunlight was seen to be slightly transparent and of a deep blue colour.

The photometrical determinations were made in exactly the same way as those with the speculum metal and steel mirrors (*Proc. Roy. Soc.* vol. xxxvi. p. 187), and the observations were about as concordant as those contained in the Tables I. and II. of the paper giving an account of the experiments.

Two complete series of observations were made with light polarised in, and perpendicularly to, the plane of incidence, and the results are given in Tables I. and II.

The angles of incidence are given in the first column, the percentage amount of light reflected in the second and third, the means of the two sets of observations in the fourth, and the amount of light which ought to have been reflected according to Cauchy's formulæ in the fifth.

TABLE I.—*Silver Film, with Light Polarised in the Plane of Incidence*

Angle of incidence	Observed			Calculated
	A	B	Mean	
30°	96·74	98·39	97·56	96·66
40	97·06	97·13	97·09	97·01
50	98·35	99·67	99·01	97·45
60	97·06	98·40	97·73	98·02
65	100·0	99·04	99·52	98·29
70	99·02	98·41	98·71	98·61
75	99·02	99·05	99·03	98·94

TABLE II.—*Silver Film, with Light Polarised Perpendicularly to the Plane of Incidence*

Angle of incidence	Observed				Calculated
	A	B	C	Mean	
30°	89·25	86·30	—	87·77	95·74
40	90·69	87·02	—	88·85	95·30
50	89·31	87·09	—	88·20	94·66
60	85·10	86·41	—	85·75	93·75
65	86·09	85·0	—	85·54	93·22
70	86·33	86·50	83·85	85·56	92·73
75	83·91	87·55	86·17	85·88	92·50

The principal incidences and the principal azimuths were determined, and the means of two sets of eight observations each are given in Table III.

The values of the principal azimuths are higher than any obtained before in the course of these experiments, whilst those of the principal incidences are nearly the same as those obtained with the silver plate polished with rouge (*Proc. Roy. Soc.* vol. xxxi. p. 493), but considerably in excess of the determinations previously made with silver films.

TABLE III.

	Principal incidence		Principal azimuth
	75° 38′	... ...	44° 07′
	75 36	... ...	43 40
Mean ...	75 37	... ...	43 53

The calculated and observed values for the light polarised in the plane of incidence agree very fairly, the calculated values being slightly the lowest.

For light polarised perpendicularly to the plane there is considerable difference between the two sets of numbers, the calculated values being considerably the highest.

As has already been stated, the silver film was, to some extent at least, transparent, and it was found that when a Nicol was held between the eye and the silvered glass, and sunlight was incident obliquely upon the film, the brightness and colour of the transmitted light varied with the position of the Nicol; the image of the sun being brightest when the short diagonal of the Nicol was in the plane of incidence, and darkest and of a deep blue colour when the long diagonal was in that plane. Hence it would appear that at oblique incidences light which is polarised perpendicularly to the plane of incidence penetrates to a greater depth in the film than that polarised in the plane—a result that is in accordance with the conclusion drawn from the experiments with silver films already referred to, and one that may account for the difference in the observed and calculated intensities of light polarised perpendicularly to the plane of incidence reflected by the silver film.

In order to ascertain whether the difference between the observed and calculated results was really due to this cause or not, a thicker film was prepared by depositing a second coating of silver on a freshly-prepared film.

The same glass plate was used; the silver weighed 0·0072 grm., and its thickness was therefore 0·0001737 mm., or as nearly as possible double that of the single film.

The thick film was not absolutely opaque, as the disk of the sun on a clear day could just be seen through it, but it transmitted much less light than the film previously used.

Tables IV. and V. give the results of two series of observations made with it, and also the theoretical amount of light which should have been reflected, calculated from the values of the principal incidence and principal azimuth given in Table VI.

TABLE IV.—*Double Silver Film, with Light Polarised in the Plane of Incidence*

Angle of incidence	Observed			Calculated
	A	B	Mean	
30°	97·24	97·39	97·31	97·04
40	98·27	98·87	98·57	97·35
50	98·62	101·10	99·86	97·74
60	98·97	99·62	99·29	98·22
65	100·0	99·25	99·62	98·45
70	100·0	100·0	100·0	98·79
75	99·31	99·62	99·44	99·06

TABLE V.—*Double Silver Film, with Light Polarised Perpendicularly to the Plane of Incidence*

Angle of incidence	Observed			Calculated
	A	B	Mean	
30°	98·77 100·60	100·40	99·92	96·21
40	97·60	97·50	97·55	95·82
50	98·20	96·28	97·24	95·24
60	97·62	95·67	96·64	94·43
65	95·88	95·68	95·78	93·94
70	94·20	93·11	93·66	93·48
75	94·03	93·77	93·90	93·26

TABLE VI.

	Principal incidence		Principal azimuth
	75° 50′	... ...	43° 52′
	75 45	... ...	44 07
Mean ...	75 47	... ...	44 0

The values of the principal incidence and azimuth are slightly higher than those obtained with the thinner film, and therefore the percentage amount of light which, according to theory, should be reflected by the silver, is also higher.

The tables show that both for light polarised in and perpendicularly to the plane of incidence the observed intensity exceeds the calculated intensity, in the former case by about 1, and in the latter by about 2 per cent., except at incidences of 30° with light polarised in the plane, and 70° and 75° for light polarised perpendicularly to the plane, for which angles the observed and calculated intensities agree closely.

These results appear to confirm the general conclusion arrived at in the former paper, that, although the received formulæ for metallic reflection are approximately correct, they are not a complete expression of the facts of the case.

Zoological Society, May 20.—Sir Joseph Fayrer, F.R.S. vice-president, in the chair.—Mr. W. T. Blanford, F.R.S., exhibited and made remarks on a series of horns of the Wild Sheep of the Pamir, *Ovis polii*, Blyth, which had been obtained by the Hon. Charles A. Ellis, F.Z.S., from the Pamir district during his recent journey to Yarkand.—Mr. R. Bowdler Sharpe exhibited and made remarks on a second specimen of the new European Nuthatch (*Sitta whiteheadi*) recently discovered by Mr. Whitehead in Corsica.—Dr. J. G. Garson exhibited and made remarks upon a specimen of *Lithodes maia*, the Northern Stone-Crab.—Mr. Frank E. Beddard, F.Z.S., read the first of a series of papers on the Isopoda collected during the voyage of H.M.S. *Challenger*. The present communication treated of the genus *Serolis*, sixteen species of which were represented in the specimens obtained during the expedition. Of these nine were described as new. The author also gave a short account of the geographical distribution of the genus, and pointed out some of its peculiar structural points.—Mr. Gwyn Jeffreys, F.R.S., read the eighth part of his papers on the Mollusca of the *Lightning* and *Porcupine* Expeditions. It included the families Aclidæ, Pyramidellidæ, and Eulimidæ, with seventy-five species. Two genera and twenty-three species were described by the author as new to science.—Prof. Jeffrey Bell read the fourth of his series of papers on the Holothurians. The present communication gave an account of the structural characters of the Cotton-Spinner (*Holothuria nigra*), and especially of its Cuvierian organs.—Mr. F. Day read a paper on races and hybrids among the Salmonidæ, in continuation of a former communication made to the Society, and continuing an account of the experiments made by Sir James Gibson-Maitland in the hybridisation of Salmonidæ in the ponds at Howietown.—A communication was read from Mr. R. Collett, C.M.Z.S., containing the description of some apparently new Marsupials obtained by Dr. Limholtz in Northern Queensland. These were described as *Phalangista archeri*, *Ph. herbertensis*, *Ph. lemuroides*, and *Dendrolagus limholtzi*.

Geological Society, May 14.—Prof. T. G. Bonney, F.R.S., president, in the chair.—John Ruscoe was elected a Fellow of the Society.—The following communications were read:—On the pre-Cambrian rocks of Pembrokeshire, with especial reference to the St. David's district, by Dr. Henry Hicks, F.G.S., with an appendix by Thomas Davies, F.G.S. The author in this paper gave further detailed evidence in addition to that already submitted by him, to show that the Geological Survey Map of the district of St. David's and of other parts of Pembrokeshire is incorrect in some of its most essential features, and inaccurate in very many of its petrographical and stratigraphical details. Some new areas in South Pembrokeshire were also referred to. He replied also to the criticisms contained in the paper by the Director-General of the Survey, read last year before the Society, and indicated that Dr. Geikie had completely misunderstood the sections and the order of succession of the rocks at St. David's. He pointed out that the views so elaborately worked out by the Director-General to show the evidence of metamorphism in the rocks, were based on the entirely false supposition that the granitoid rocks were intrusive in the Cambrian rocks, and that the felsites were merely peripheral masses. He showed, by producing abundant fragments of the granitoid rocks and of the felsites from the basal Cambrian conglomerates, that the granitoid rocks were the very oldest rocks in the district, and that they must undoubtedly be of pre-Cambrian age. He proved, from microscopical evidence, that the rocks supposed to have been altered by the intrusion of the granitoid rocks, were in the condition in which they are now found before the Cambrian rocks were deposited, and, moreover, that the supposed concretions in the porcellanites and conglomerates, claimed to have been due to metamorphism, had turned out, on microscopical evidence, to be actually fragments of old pre-Cambrian rhyolites inclosed in the sediments. It was shown also that at the points indicated by the Director-General, where the evidences of intrusion were supposed to be seen, there was not the slightest change of a metamorphic character induced in the sedimentary rocks in contact with the granitoid rocks. The only difference that could possibly be recognised in them by the aid of the microscope was such as is well known to be the result of crushing when in the neighbourhood of faults. Indeed there was the clearest evidence possible to show that the junctions were merely fault junctions. The supposed fold in the Pebidian rocks, the author stated, was impossible if petrological evidence was of any value. The author also produced many facts to show that the conglomerates at the base of the Cambrian constantly overlapped the different members of the series which he claimed to be of pre-Cambrian age, and that the unconformity was very marked and to be clearly seen in many coast sections. The conglomerates were shown also to contain well-rolled pebbles of all the series included under the names Dimetian, Arvonian, and Pebidian, as proved by careful microscopical examination of the fragments by Mr. T. Davies and himself. An appendix by Mr. Davies, describing the microscopic character of the rocks, accompanied the paper.—Note on a specimen of iron amianthus, by the Rev. J. Magens Mello, M.A., F.G.S. The accompanying specimen was found at the bottom of one of the Wingeworth iron-furnaces, near Chesterfield, and was given to the author by Mr. Arthur Carrington, one of the owners. The furnaces have been lately blown out for repairs, and in the mass of slaggy refuse at the bottom a thin layer of the curious product known as iron amianthus was interposed between the sand and the iron refuse. The red sand at the bottom of the furnace was converted in its upper part into a compact, hard, white sandstone an inch or two in thickness, and upon the top of this the iron amianthus occurred in snow-white fibrous masses, the fibres radiating in a concentric manner, and forming more or less botryoidal concretions, somewhat resembling hæmatite in appearance, and separated by extremely thin plates or septa of iron, by which the entire mass is divided into irregular prisms of about half an inch in diameter.

Physical Society, May 24.—New member, Mr. F. C. Phillips, electric engineer.—Prof. W. G. Adams took the chair while the President, Dr. Guthrie, gave a brief summary of his recent researches on eutectic alloys, that is alloys of low fusing point. The complete research will be published in the Society's *Proceedings*. Dr. Guthrie showed by means of tables and curves of results that mixtures of water and nitre, nitre and nitrates, &c., behaved in the same way as fusible alloys, such as alloys of lead and bismuth. On cooling down the alloy or mixture, the ingredient present in richer quantity crystallised out. There seemed to be no definite molecular proportions in these alloys. A "tetra-eutectic" alloy of bismuth 47·38, tin 19·97, lead 19·36, cadmium 13·29 per cent., was exhibited by the author, which fused at 71°, or in boiling alcohol. Rose's fusible metal melts at 93°. Results were given of the behaviour of mixtures of water and the aniline salts, salicylate, oxalate, &c.; also of water and tri-ethylamine, and other members of the ammonia group. Dr. Guthrie's observations tended to show that fusion and solution were of the same nature. He pointed out their bearing on mineralogy and geology, and inferred that water in igneous rocks was there from the first, and not by infiltration, as some suppose. —The President then took the chair, and Dr. W. H. Stone exhibited a simple, cheap, and portable galvanometer for hospital use, made of a boxwood cylinder with coils wound round it, and a needle with mirror, inserted into a test-tube, and pushed into the hollow of the cylinder. The needle is made dead-beat by putting paraffin oil into the tube. He also exhibited a Kohlrausch metre bridge for alternating currents, a telephone playing the part of indicator. Dr. Stone employs it for measuring the resistance of the human body, which he finds to be less than 1000 ohms. With high-tension currents it appears lower than with low-tension currents. Another metre bridge of the kind with a longer wire (3 m. in this case as compared with $\frac{1}{4}$ m. in the other) was also shown in connection with a sledge induction-coil, by which the power of the current can be regulated to suit the patient. Dr. Stone stated that the body acts more like a solid than a liquid conductor. Mr. Glazebrook said he had used a similar plan with a telephone to measure the resistance of electrolytes; but found the telephone too sensitive from induction, though in Dr. Stone's work this objection might not apply. Prof. G. Forbes stated that the telephone had been applied in a similar way to comparing capacities. With regard to the danger from currents, Prof. Ayrton said the E.M.F. of the railway current at Bushmills was 250 volts, and pointed out that very intermittent currents were more dangerous than fairly continuous ones. Dr. Stone thought that with good skin contact (as with salt and water) this E.M.F. would be dangerous. Mr. Lecky instanced the reported death of a horse at Bushmills by a shock.—A new speed indicator, especially for marine engines, was exhibited by Mr. W. T. Goolden and Sir A. Campbell of Blythswood. Its action depended on the rolling of a disk on a cone, the disk traversing a screw driven by the engine-shaft. The disk forms the nut of the screw, and rotates in an opposite direction to the latter. Its position on the screw depends on the surface velocity of the cone, which is kept turning at a uniform rate by clockwork. In travelling, the disk makes a series of electric currents which indicate its position on a set of dials detached. Recording apparatus can be added. The apparatus was made by Mr. A. Hilger.—Mr. W. Baily exhibited a similar device, in which the cone was replaced by a circular plane or disk. He had invented this independently, and it had the advantage of giving a zero position to the rolling disk, though the cone was the more compact arrangement. The idea of using a screw in this manner was suggested by Mr. Shaw of Bristol some three years ago.

Berlin

Physiological Society, May 2.—Dr. Bender gave a short description of a preparation which he exhibited at the end of the meeting. It was an axolotl in the stage of development in which the heart consists of a tube with a sacular expansion at one part, corresponding to the atrium, and then forms a loop, the ventricle, afterwards passing over into a second expansion, the bulb; the animal is in this stage still transparent enough to permit of the movement of the blood through the three chambers of the heart being seen distinctly.—Dr. Herter described the experiments which Dr. Lukjanow had made in his laboratory upon the influence of increased tension upon the absorption of oxygen. The question is of physiological importance because, if it is decided by experiment in the negative, the existence of an optimum amount of oxygen in the air will be proved, which would coincide with normal percentage proportion of oxygen in the air, whereas if the experiment should result in proving that the absorption of oxygen increases with the increase of the oxygen tension, then this oxygen absorption and the consequent oxidations would have to be included in the general combustion processes whose intensity is known to increase with the increased tension of oxygen. The experiments were conducted after the method of Regnault and Reiset. The animals were placed inside a bell-jar, into which the air entered on one side along with an additional quantity of oxygen, which could be varied at pleasure, and from which it was drawn off on the opposite side by a tube which passed into the absorption vessels where the carbonic acid was removed, and the residue was provided with fresh oxygen and led back into the bell-jar. An offset from the air tube allowed of a sample of the expired air being drawn off at any time for analysis. In all fifty animals were experimented upon, which were kept fasting for half a day before commencing the experiment. The oxygen of the inspired air varied between 30 and 90 per cent. The mean result of all the experiments on guinea-pigs, rats, dogs, and cats, was a slight increase of the oxygen absorption, to wit 104 volumes as against 100 absorbed from normal air. Dr. Herter is of opinion that this small increase cannot be regarded as a consequence of the increased oxygen tension, because, in individual animals, the means of oxygen absorption sometimes fell below, and sometimes exceeded the normal amounts, and further, because they did not vary proportionally with the increased tension of oxygen in the air. The small increase of the general mean must be referred to other causes, *i.e.* the movements of the animals during the experiments. No increase of temperature was observed under the increased pressure of oxygen. Further experiments were made upon animals in which one could assume an increased demand for oxygen in consequence of high fever being present, but not even did the animals that had fever take up more oxygen from the air that was charged with a more than normal amount of oxygen. Likewise, animals from whom a large quantity of blood had been withdrawn behaved in exactly the same way as normal animals in presence of the surplus of oxygen. The conclusion to be drawn from all these experiments is that the absorption of oxygen is not an ordinary combustion process, and that the normal composition of the atmosphere contains an optimum percentage amount of oxygen.—Prof. Busch spoke about caries of the teeth which has been so little scientifically investigated, because in studying it the external hurtful processes have been alone considered, whereas the second important factor, the resisting power of the teeth, has been quite overlooked. In regard to the latter, Prof. Busch called attention to the fact that caries of the teeth had been observed in no animal, and that it appeared to be peculiar to man. Caries of the teeth, however, appears not to be a characteristic of civilised man alone, but it has been observed in large collections of skulls even in those of prehistoric time. Some races are more disposed to it than others. For instance, the Celtic, Arabian, and Polish races appear to possess a relative immunity. This is less the case with the Indo-Germanic race. Certain families are particularly predisposed to it. General habit of body has a pronounced influence upon its development, as well as menstruation and pregnancy in women, chlorosis, typhoid, &c. Disposition to caries shows itself even in the developing tooth in the composition of its enamel, which is undulating, whereas teeth with quite smooth enamel have much greater power of resistance. The enamel appears to be the only tissue in the body which is subject to no metabolism, and which remains quite unchanged. Every alteration in it which is caused by external influences, and every defect of the enamel remains during the whole of life, and can never be repaired. Dentine also shows differences in its structure as regards its disposition to caries. The dentine tubes either run regularly close side by side to each other, such teeth having a greater power of resistance; or the dentine tubes branch and surround cellular bodies, or even small air vesicles, such teeth falling an easy prey to caries. If dentine has been decalcified at any place by the action of acids, it undergoes putrefaction under the influence of bacteria which do not seem to belong to any specific species. Dentine is sensitive, although nerve filaments have not as yet been traced into it. Actual toothache does not occur in the course of caries until it has reached the pulp. The inflammation of the pulp is particularly violent and painful, because the tissue is so richly supplied with blood-vessels and nerve-filaments. As the products of inflammation cannot escape, they collect and work their way downwards, where they produce the most painful inflammation of the roots and the periosteum. The chief object of the rational treatment of caries of the teeth consists in the removal of every particle of carious substance out of the diseased tooth and to protect the sound dentine that has been exposed against external injurious influences by covering it with a firm substance which is not attacked by acids: gutta-percha, cement, or gold. Although the dentine is not as unchangeable as the enamel, but manifests, by its becoming firmer or softer, that it is not quite uninfluenced by tissue changes, yet its caries is not an irritative process that the dentine takes an active part in, but a passive process, and consequently the removal of all diseased portions, and the protection of the non-carious part of the tooth by filling with a resistant mass suffices to stay the morbid process completely.

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