

his prefatory observations, Mr. Owen also shows, that the genus *Phytosaurus* was established on the casts of the sockets of teeth of *Mastodonsaurus*; and that the latter generic name ought not to be retained because it conveys the idea of a mammiloid form of tooth, whereas all the teeth of the genus so designated are originally and for the greater part permanently cuspidate; and because the second element of the word *saurus* implies a false affinity, the remains belonging not to the Saurian, but to the Batrachian order of reptiles. He therefore proposes to substitute the generic appellation *Labyrinthodon*, founded on the structure of the teeth. The only portions of the Batrachian hitherto described from the German Keuper consist of teeth, a fragment of a skull, and a few imperfect vertebrae; and the only specimens from the Warwick sandstone determined by Mr. Owen at the time the memoir was written, consisted of teeth. In this paper he confines his attention, therefore, to a comparison of the dental structure of the continental and English remains. The teeth of the *Labyrinthodon Jaegeri* (*Mastodonsaurus Jaegeri*, Von Meyer) of the Keuper, are of a simple conical form, with numerous longitudinal striae; and the teeth from the Warwick sandstone, transmitted by Dr. Lloyd, for Mr. Owen's examination, closely resemble them. These external characters being insufficient to prove even generic identity, the author had sections made, in various directions, of portions of the teeth of the German fossil forwarded to him by Dr. Jaeger, and of the English reptile, and they exhibited such decided characters, that he was enabled not merely to separate them from all known reptiles, but to establish a generic community of character in the continental and British remains. It was not, however, until he had studied these sections attentively, in comparison with the teeth of true Saurians, Batrachians, and other animals, that he comprehended the principle of the singular cerebriform convolutions which pervade the dental structure of this remarkable reptile. The nearest resemblance to it, is exhibited in the base of the tooth of the *Ichthyosaurus*. In this fang vertical folds of the external layer of cement are inflected inwards, at pretty regular intervals, around the circumference of the tooth towards the centre, to a distance about equal to the breadth of the interspaces of the inflected folds; and the interspaces are occupied by corresponding processes of the dentine which radiate from the central mass of that substance. The thickness of this interblended cement and dentine, surrounding the pulp cavity, is about one-eighth of the diameter of the tooth. The plan and principle of the structure of the tooth of the *Labyrinthodon* are the same, but much more highly complicated. The following details were exhibited in a transverse section taken about the middle third part of a fragment of a tooth of *L. Jaegeri*: the entire length of the tooth having been probably $3\frac{1}{2}$ inches, and the breadth at the base $1\frac{1}{2}$ inches. The converging vertical folds of the external cement extend close to the centre of the tooth, and present, instead of straight simple lamellae, a series of irregular folds, increasing in complexity as they proceed inwards, and resembling the labyrinthine anfractuosités of the surface of the brain: each of these converging folds is slightly dilated at its termination, close to the pulp cavity. Notwithstanding this singular arrangement, the ordinary laws of dental structure are strictly adhered to, every space intercepted by a convolution of the folds of the cement being occupied by processes of dentine. With respect to the general external characters of the tooth of the *Labyrinthodon*, Mr. Owen states, that the longitudinal grooves which correspond to the inflected folds of the cement, extend from the base upwards, to about three-fourths of the height of the tooth, decreasing in number as the tooth diminishes in diameter, and disappearing about half an inch from the summit of the tooth. Each fold of cement penetrates less deeply, as the groove approaches its termination; and the structure of the upper part of the tooth, Mr. Owen conceives, may be more simple than that of the lower, but he has not yet been able to extend his observations to it. The dentine consists of a slender, central, conical column, hollow for a certain distance from its base, and radiating outwards from its circumference a series of vertical plates, which divide into two, once or twice before they terminate at the periphery of

the tooth. Each of these diverging and dichotomizing vertical plates gives off, throughout its course, narrower vertical plates, nearly at right angles to the main plate, in relation to which they are generally opposite, but sometimes alternate. Many of the secondary plates, given off near the centre of the tooth, also divide into two before they terminate. They partake of all the undulations which characterize the inflected folds of the cement. About the upper third of the tooth the central pulp cavity is reduced to a line; but fissures radiate from it, corresponding in number with the radiating plates of the dentine; and one of them is continued along the middle of each plate, dividing where it divides, and penetrating each bifurcation and process. The main fissures extend to within a line, or half a line, of the periphery of the tooth, their terminations, as well as those of the fissures of the lateral processes, dilating suddenly into sub-circular, oval or pyriform spaces. These spaces are centres of radiation of fine calcigerous tubes, which with their uniting clear substance constitute the dentine. The number of these tubes, also centres of minor ramifications, defies all calculation. Their diameter is the $\frac{1}{1000}$ of an inch, and the interspaces are equal to seven diameters. A tooth from the sandstone of Coton End quarry, lent to the author by Dr. Lloyd, nearly resembles in size and form the smaller teeth of *Labyrinthodon*, figured by Jaeger; and all the peculiarities of the labyrinthine structure of the Keuper tooth are so clearly exhibited in it, that Mr. Owen considers the differences to be only specific. At the upper part of the tooth is a layer of firm dentine, separated from the rest by a thin stratum of fine calcigerous cells, and, until very recently, considered by the author to be enamel. The inflected folds are continued for a greater relative distance before the lateral inflections commence, than in the German species; and the anfractuosités are fewer in number; some of the folds are also reflected backwards, from near the central pulp cavity, for a short distance before they terminate. The modifications of the complex diverging plates of the dentine, are shown hardly to exceed those of a specific character, while the composition of the dentine is stated to be the same as in the *Labyrinthodon Jaegeri*. A transverse section through the middle of a smaller and relatively shorter tooth, from the Warwick sandstone, exhibited more complicated anfractuosités, with numerous secondary and tertiary foldings, and the external layer of cement was relatively thicker than in the *Lab. Jaegeri*. The generic identity of the reptiles indicated by the teeth from the Warwick sandstones, with the *Mastodonsaurus* of the German Keuper, Mr. Owen considers fully established by the accordance of their dental structure; and in conclusion, he says, if geology has, in this instance, derived any essential aid from minute anatomy, in no other has the comparative anatomist been more deeply indebted to geology, for not the slightest conception could have been deduced from an investigation, however extensive, of the teeth of existing animals, of the singular and complicated modifications of dental structure revealed by these fossils.

2. *Observations relative to the Elevation of the Shores of Waterford Haven, during the Human period, and on the Geological Structure of the District,* by T. Austin, Esq.—From the Rock of Passage to Woodstown, a distance of three miles, the western side of Waterford Haven presents a nearly continuous cliff of clay and gravel, formed principally of the detritus of old red sandstone, and inclosing a bed, from one to four feet thick, of *Cardium edule*, with other existing species of marine testacea, and a few land shells. In this bed, immediately north of Newtown Head, the greater portion of a human skeleton was found, about five feet below the surface of the ground, and the same distance above high-water mark. The valves of *Cardium edule* were equally as numerous there as in other parts of the bed, and many of them were lodged in the cavity of the skull. From a careful examination of the conditions under which the skeleton was found, more especially as none of the shells were scattered through the superincumbent loam, Mr. Austin is convinced the ground had never been disturbed for sepulture: he is consequently of opinion, that the body was washed into the estuary during the accumulation of the shelly bed; that it was arrested in its present position by a curva-

ture in the level, due to a projecting mass of trap; and that an elevation of the country has taken place since the commencement of the human period. Patches of the shelly bed occur as far eastward as eight miles from the shore; and on the eastern side of the Haven a similar deposit exists. Mr. Austin, therefore, also infers that the extent of the Haven was once much greater than it is at present. The author then gives a general description of the geological structure of the districts immediately adjacent to the shores of Waterford Haven. The formations of which they consist are mountain limestone, old red sandstone, schistose strata, considered to belong to the Silurian system, and trap rocks. The mountain limestone occurs only at Hook Point, the southernmost headland of the Wexford side of the Haven. The upper, or sandstone, beds of the old red system, succeed to it conformably, and contain obscure vegetable remains, also thin seams and nodules of anthracite, and occasionally small masses of black copper ore. These beds are underlain by marls, sandstones, and conglomerates, composing the mass of the formation, and about 1,600 feet thick. The formation constitutes also Broom Hill, and the opposite points called Creden Head and Knockavelish Head, likewise a little patch north of the latter; and near the upper extremity of the Haven, the headlands adjacent to Arthurstown, and at Passage. At all the first-mentioned localities the strata dip towards the south, but at the two latter towards the north. The schistose strata occur between Hook Point and Broom Hill, and they constitute the whole of the country on both sides of the Haven, from Broom Hill and Knockavelish Head, to the old red promontory near Arthurstown and Passage, with the exception of some masses of trap near Duncannon Fort and Newtown Head. The strata are, for the greater part, variously contorted, in consequence, Mr. Austin believes, of great lateral pressure; and they are brought at several points into unconformable juxtaposition with the old red sandstone. Near Arthurstown the dip is towards the north, at an angle of 70° , and the overlying old red sandstone is inclined in the same direction, but at an angle not exceeding 30° . At Duncannon Fort an impure limestone, containing trilobites, corals, and testacea, is associated with the slates; and a little north of Newtown Head, on the opposite side of the Haven, some highly inclined fossiliferous strata are visible at ebb-tide. It is on account of the resemblance of the organic remains obtained at these localities, with species figured in Mr. Murchison's work, that the author places the schistose strata in the Silurian system. The trap rocks constitute the point on which stands Duncannon Fort; they also form Newtown Head, and Mr. Austin is of opinion, that the same masses range westward to Tramore, and Great Newtown Head, where they are lost in the St. George's Channel. Wherever the trap appears on the surface the beds are tilted.

3. A paper by Mr. Lyell, 'On the Freshwater Fishes of Mundesley,' as determined by M. Agassiz.—In a former memoir by Mr. Lyell, 'On the Boulder Formation and associated Freshwater Deposits of Eastern Norfolk,*' the scales and teeth of fishes procured from the Mundesley fluviatile beds were stated, on the authority of Mr. Yarrell and the Rev. L. Jenyns, to belong to the *Esox lucius*, to a trout, to a carp, probably the *Cyprinus carpio*, and to a distinct species of Perca. M. Agassiz, during his late visit to England, also examined the same collection of specimens, with some additions, and fully confirmed Mr. Jenyns's decision with respect to the distinctness of the perch; but he is of opinion that the pike is not the *Esox lucius*, that the carp is a specimen of *Leuciscus*, and that the trout is not truly a trout, though belonging to the same great family. It is therefore evident, Mr. Lyell observes, that these remains must be assigned to undescribed freshwater fishes; but that they form part of an ichthyological Fauna more modern and more nearly resembling the recent than any other with which M. Agassiz is acquainted in a fossil state. Mr. Lyell found similar remains at Runtun, near Cromer, where they are associated, as at Mundesley, with freshwater testacea, all of existing species, including the *Paludina minata*, formerly supposed to be extinct, but lately proved, by Mr. Morris, to be identical with

* See Athenæum, No. 629, p. 40.

the *P. marginata* of Michaud, a recent species living in France. It is possible, therefore, Mr. Lyell says, that these unknown fishes may exist in the lakes or rivers of the northern parts of Europe or America, more especially as M. Agassiz is at present unacquainted with the freshwater fishes of Norway, Sweden, Iceland, Greenland, Labrador, Canada, and even the most northern parts of Scotland and the Shetland Isles; and in conclusion the author adds, it seems natural to look northward for types analogous to the Mundesley fishes; because the beds in which they occur were deposited contemporaneously with the drift accumulated by the agency of floating ice.

ASIATIC SOCIETY.

March 6.—Professor Wilson in the chair.

A paper by the Rev. Dr. Stevenson, of Bombay, on the Bauddha Vaishnavas, was read.—The people or sect designated by Dr. Stevenson under the above name, are found scattered throughout the country of the Marhattas, and wherever that nation has formed any settlements. The Bauddha Vaishnavas are called by others *Vithal bhaktas*, because they worship Vishnu under the form of Vithal; but as they themselves consider Vithal to be the Buddha avatar of Vishnu, and take their religion from Buddhists as well as Brahmans, the writer prefers the designation Bauddha Vaishnava. The legendary history of the avatar most current among themselves, makes Vishnu proceed to Pandharpur, where he pays a visit to Pundarik, a dutiful son, who is at the moment occupied in the pious work of scrubbing his father's foot with a brick. Fully intent on his task, Pundarik did not notice the god until he had assumed a luminous appearance, when he merely threw him the brick for a seat, but continued to hold his father's foot. The god, pleased with the filial piety of the saint, took up his abode at Pandharpur, by the names of Pandurang (luminous appearance), and Vithal, (he who seats himself on a brick). The Bauddha Vaishnavas differ from other sects in taking reason for their guide, instead of authority; though they endeavour, as far as they can, to conciliate the theism of the Brahmans with the morality of the Buddhists. They affirm also that the avatar of Buddha was intended to instruct mankind in their duties; and not, as declared by the Brahmans, to mislead them, from the fear of the gods being inconvenienced by the great numbers of good men, who were every day finding their way to heaven.—Another important particular in which they distinguish themselves, is the indifference of caste which is felt by them, though in practice they are compelled to adopt several of its restrictions. They say that at all religious assemblages true worshippers should eat together. The expression of one of their writers is: "At the great door of the temple, all the castes are formed into one body." A story is told illustrating this dogma, narrating the giving of a feast, to which are invited Brahmans, and persons of other castes, and even Pariahs. Vishnu attends at the feast; and the Brahmans, who are offended at the admixture of castes, and refuse to partake of the food provided, are confounded by the manes of their ancestors, who come down to be present at the ceremony.—The Bauddha Vaishnavas speak slightly of the Vedas, of Brahmans, of pilgrimages, of washing and crowning images, and of other superstitions. Several passages are quoted from writers of the sect, in which their contempt is openly manifested. Of the Brahmans they say: "the bells in their girdles jingle about their loins; but their tongues are dumb in divine knowledge." Another conformity with Buddhist custom is the worshipping of the impressions made by the feet of their saints; and this is one of the few matters in which they give way to a practice confessedly superstitious. There is one point in which these people differ from Buddhist and Brahman; and it is, that there is an interchange of love between the deity and the worshipper. This doctrine, which is wholly foreign to Indian ideas of theology, Dr. Stevenson is of opinion may have been borrowed from the Mohammedans. Certain points of religion maintained by the Bauddha Vaishnavas indicate a kind of feeling, very different from that usually attributed to Hindu sectaries; and has induced a belief that some influence may have been derived from the Christian religion, as it was introduced into India at early periods. The chief of these are the

power of faith to effect any purpose; the forgiveness of injuries; and the return of good for evil. The subject is very interesting; and the doctrine, as far as India is concerned, is peculiar. The ancient Rishis are universally represented as cursing their enemies; and although in more recent times a milder spirit has been exhibited by both Buddhist and Brahman, none go so far as this sect; one of whose saints is represented as loading with favours some villains who had robbed and maimed him; and, when they had gone to hell for their crimes, as successfully interceding with Vishnu for their release. The history of the Bauddha Vaishnavas may be traced up to the fourteenth century, to the time when the Mohammedan power was first established in the Dekhan, and a more powerful superstition repressed the persecuting spirit of the Brahmans, who had expelled the Buddhists, and extinguished all hope of resistance to their own domination. The Mohammedan power, which all its intolerance, gave a great liberty to those who were compelled, by the grossness of the dominant faith, to dissent from its practices; and several sects successively rose, who opposed the multifarious theology and superstitious rites of the Brahmans. Among these the Bauddha Vaishnavas flourished. At the decline of the Musulman power, when the Marhatta empire became again Brahman, the energy of the sect seems to have ceased: hardly one religious treatise has been composed since the days of Sivajie; and they are gradually assimilating to the idolatry round them. They are now chiefly composed of the manufacturing and mercantile classes; though not a few Brahmans, and many from the cultivator class, have joined them.

MEETINGS FOR THE ENSUING WEEK.

SAT.	Asiatic Society	Two, p.m.
	Geographical Society	Nine.
MON.	Royal Academy (<i>Sculpture</i>)	
	Society of British Architects	Eight.
	Institution of Civil Engineers	Eight.
TUES.	Architectural Society	Eight.
	Zoological Society	1 p. Eight.
WED.	Geological Society	2 p. Eight.
	Society of Arts	Eight.
	Royal Society	1 p. Eight.
THUR.	Society of Antiquaries	Eight.
	Royal Society of Literature	Four.
	Royal Academy (<i>Painting</i>)	
FRI.	Royal Institution	1 p. Eight.

MUSIC AND THE DRAMA

QUARTETT CONCERTS, HANOVER-SQUARE ROOMS.—Messrs. BLAGROVE, GATTIE, DANDO, and LUCAS, beg to inform the Public, that the THIRD QUARTETT CONCERT will take place on THURSDAY EVENING NEXT, March 25, when will be performed Mendelssohn's new Trio, —Pianoforte, Madame Dulcken; Quartetts by Mozart and Mayseider; Beethoven's Trio in c Minor; and Vocal Music, accompanied by Mr. Sterndale Bennett, in which Miss Birch, Miss Woodratt, and Mr. Parry will perform. Tickets, 7s. each, or 18s. each to admit three persons, may be obtained of the Conductors; of Messrs. Colliard, Cheapside; Cramer, Regent-street; and Chappell, Bond-street.

DRURY LANE.—The German company has commenced its season with 'Der Freischütz,'—spiritedly, as regards a powerful and energetic chorus, able to act as well as to sing,—satisfactorily, as regards the tenor, who is none other than our old friend Herr Haitzinger, but little the worse for wear,—and splendidly as regards its *prima donna*, Madame Stöckl Heinefetter. She is one of the few instances of the benefits of a large arena for exhibition: her voice, which sounded heavy in the Prince's Theatre, is in Drury Lane rich, melodious, and all-pervading. Catalani herself owned hardly a finer natural organ; and its possessor, improved though she be, has not the remotest idea of the brilliant effects which might be produced with it, would she subject it to only a quarter of the vocal study which poor Malibran was forced to bestow on the mastery and management of hers. The present wants of Drury Lane are a more efficient *basso* than Herr Sesselmann, and a more efficient conductor than Herr Ganz. Both, however, are promised to us: and therefore, in the meantime, (the beauty of Weber's music being understood beyond need of further expatiation,) we will dwell upon the truth, zeal, and earnestness which the Germans bring into their performances. This is only just beginning to bear its due value in England. It will be twenty years more before the Italian Opera chorus is made to act; and then, and not till then, may we look for a revival of the *chefs-d'œuvre* of the old repertory.

As we have accidentally gone from Drury Lane to the Haymarket, and last week promised a word or

two concerning 'Le Diable Amoureux,' and Madame Guy-Stephan, by way of keeping faith we will here say, that the story of the evil spirit who falls in love with the mortal she is commissioned to tempt, loses largely by its transmission from Paris to London, where, as is well known, the *ballet* is of necessity more economically mounted. Madame Guy-Stephan is three good sizes larger than Montessu, but without Montessu's rapidity and sprightliness. She stops the gap, till Cerito, or Taglioni, or some other *première danseuse* shall arrive, most substantially. The younger Albert, too, is here, more brilliant and elastic in his flights than formerly.

PHILHARMONIC SOCIETY.—*Second Concert*.—There was matter for many reviews in this concert. To begin with the selection:—this was admirable, to our taste; and, pleased or displeased, an audience was attracted by it, and held attentive throughout. It was faulty, as far as regards choice of conductor. We are really curious to know, upon what principle Mr. C. Lucas, who never wielded baton in the Philharmonic orchestra before, was selected to preside over the performance of so complicated and difficult a programme. Such an appointment was unfair to one who is a highly cultivated musician, and a modest as well as a classical artist. The consequence was, that though orchestra and chorus were kept together, their performance of Weber's mermaid music from the second act of 'Oberon'—and of Mendelssohn's 'Lobgesang'—resembled the performances of the same pieces under their respective composers, about as much as a school-boy's correct and unaccented reading of Hamlet's soliloquies, resembles those magnificent passages when delivered by John Kemble or Young. The style of execution during the evening, in short, was coarse and unpoetical. Further to hamper the poor conductor, the Directors had given him two *soprani* to work with, neither of whom sung in tune—and this for Weber's delicious

'Oh 'tis pleasant to float on the sea!'

where the voice should be as dreamily sweet as the murmur of an ocean shell;—and this for the duet in the 'Lobgesang'—'I waited on the Lord,' than which modern art has produced no union of voices more melodious. Both the spiritual and the sacred music were sacrificed between this general misconduct and this individual feebleness; the outlines only being given. The fact should be clearly stated, because the heaviness of the Second Concert was, by many in the room, ascribed to the choice of the music. The symphony to the first act was one by Ries, in F, which we were heartily glad to hear, in spite of the close reminiscences of Beethoven with which it overflows. There is bold and brilliant orchestral writing in it; and touches of very sweet melody, when the latter is required. The way of his own, which Ries possessed, is, however, far more evident in certain of his pianoforte compositions than in his grander orchestral productions. Mr. Blagrove's concerto by Kreutzer, was a highly-finished piece of playing: but the composition, as regards music, was pretty in its details, and monotonously polished in its texture, without the idea or treatment belonging to a great work of art. The overture at the end of the first act was by M. Berlioz, to 'Benvenuto Cellini': a work so little to the taste of the classicists in the room, as to be severely hissed. This seems to us an extreme proceeding. We give up the general design of the work, not having been able to trace it: the principal subjects, too, were like all the subjects by M. Berlioz we have heard, petty and trite: and their connexion with each other most darkly mysterious. These remarks may be thought to join the hiss with an extra sibilation, but it is not so. In those parts of the music where the trombones did not overpower all their fellows, or where the clash of the cymbal did not suggest the idea, as it did to a friend of ours, of an *obligato* of broken crockery, we were struck by new orchestral combinations of the stringed and wind bands, which, in the hands of one who can originate good thoughts, and whose creed, unlike that of M. Berlioz, suffers him to work them out according to established forms, might lead to the production of magnificent and original effects. Where there is invention there must be genius; though as that of M. Berlioz confines itself only to one portion of his art, we wish that he could find some one who could play Beaumont to his Fletcher: and who, giving him figures and