

are the parts which suffer. The eruption in mild cases has at first the appearance of small raised vesicles with clear fluid, but it may become pustular or eczematous, and extensive excoriations may result. The treatment consists in thorough cleansing of the skin and the inunction of some form of parasiticide,—sulphur ointment being on the whole the best. The application should be discontinued after a few days, otherwise irritation may be produced by its use.

(2) *Vegetable parasites* consist of fungous growths in the texture of the skin and hair, which are characterized microscopically by minute round bodies or spores often coalesced into clusters or bead-like arrangements, and jointed filaments or *mycelium* of elongate and branching form. They are readily detected by removing a hair, or scraping a portion of the affected skin, treating it with a strong alkaline solution, and submitting it to microscopic examination, by which the slight differences in form and arrangement of the varieties of the parasite can be easily made out. The common name "tinea" is applied to these parasitic affections. *Tinea tonsurans*, or ringworm (parasite *Trichophyton tonsurans*), is a very common form of parasitic disease. It occurs as a result of contagion in the heads of children, and begins as circular patches with a scaly appearance and red border, which tend to spread. The hair at the part becomes thin and brittle and is easily removed. It is often extremely obstinate to treatment, and numerous agents have been proposed as specifics, not one of which, however, appears to possess infallible virtues. Among the best are oleate of mercury (5 to 10 per cent.) and other mercurial preparations, all which, however, must be used with care, and carbolic or sulphurous acid with glycerin, iodine, cantharides, &c.; but isolation of the patient as far as possible, together with strict medical supervision, are essential for the effectual treatment of this disorder. *Tinea sycosis*, or ringworm affecting the beard, and *tinea circinata*, or ringworm affecting the body, require to be dealt with in a similar manner. *Tinea favosa*, or favus (parasite *Achorion Schönleini*), is less frequently seen than the preceding. It occurs mostly on the scalp in unhealthy and neglected children, but it may affect the skin in any part of the body. It is characterized by round, yellow, sulphur-coloured, cup-shaped spots or crusts, which, when occurring extensively upon the scalp, have a peculiar mousy odour. It is very destructive of hair growth, and is most difficult to cure. The best treatment is removal of the hairs by epilation, and the employment of some of the parasitocides already mentioned, together with attention to the healthy nutrition of the patient. *Tinea versicolor*, or *pityriasis versicolor* (parasite *Microsporon furfur*), is a brown-coloured rash of scaly character occurring mostly in the form of spots or patches on the skin of the trunk, particularly on the front of the chest or between the shoulders, but sometimes also upon the arms and legs. It affects adults in whom the skin-function is not sufficiently attended to, or those who are in ill-health. The parasite affects the epidermic cells, and is readily made out by the microscope, thus enabling the disease to be distinguished from other skin disorders to which it often bears resemblance. It is best treated by the regular washing and brisk friction of the parts, and by the use of some of the applications above referred to.

SKINNER, JOHN (1721–1807), author of *Tullochgorum* and *The Evie wi' the Crookit Horn*, was an Episcopalian minister in the parish of Longside, Aberdeenshire. He held this charge for more than sixty-four years. The son of an Aberdeenshire schoolmaster, born at Balfour in 1721, he had been intended for the Presbyterian ministry, but, after passing through Marischal College, Aberdeen, and teaching

for a few years, he took orders in the Episcopal Church, and was appointed to the charge of Longside in 1742. There was a considerable remnant of Episcopacy in Aberdeenshire, but very soon after Skinner joined it it became, in consequence of the Jacobite rebellion in 1745, a much persecuted remnant. The young pastor's church was burnt; his house was plundered; for some years he had to minister to his congregation by stealth; and in 1753 information was lodged that he had broken the law by officiating to more than four persons besides his own family, and he suffered imprisonment for six months. After 1760 the penal laws were less strictly enforced, but throughout the century the lot of the Episcopalian ministers in Scotland was far from comfortable, and only the humblest provisions for church services were tolerated. Skinner's robust nature, however, made light of all privations; and his kindliness, humour, conviviality, ready wit, and generous force of character made him personally a favourite far and near outside the bounds of his own denomination. In 1789 he was presented with the freedom of the town in whose jail he had been a prisoner for conscience sake. It is by his songs, limited in quantity, but some of them of the very highest quality, that Skinner is generally known. An interesting correspondence took place between him and Burns, who considered *Tullochgorum* "the best Scotch song Scotland ever saw," and addressed the reverend poet with touching respect. His best songs had stolen into print; a collection was not published till 1809, under the title of *Amusements of Leisure Hours*. Such literally they seem to have been. Throughout his life he was a vigorous student, and in spite of his scanty resources established a more than local reputation for scholarship, while, according to his latest biographer, he had a paramount influence on the doctrinal views of his clerical brethren in the north. He published in 1788 an *Ecclesiastical History of Scotland*, in the form of letters; and other works in the same form, which best suited his easy unaffected strength, were collected and published by his son after his death (June 1807), having previously had a wide circulation, in manuscript. His prose style has the happiness, ease, and lucid force of a natural master of language. The reasoning of his answer to Beattie's *Essay on Truth* is an evidence of his robust clearness of intellect.

A minutely accurate biography of Skinner, in connexion with the history of Episcopacy in the north of Scotland, was published by the Rev. W. Walker in 1883. An edition of his songs and poems by Mr H. G. Reid, 1859, contains an interesting memoir.

SKIPTON, an ancient market-town in the West Riding of Yorkshire, is situated on the river Aire, on the Leeds and Liverpool Canal, and on the Midland Railway, 9 miles north-west of Keighley and 15 south-east of Settle. It is substantially built of stone. The strong castle built by Robert de Romille in the time of the Conqueror was partly demolished in 1649, but was restored by the countess of Pembroke. Of the ancient building of De Romille all that now remains is the western doorway of the inner castle. In the castle grounds are the ruins of the ancient parish church of St John. The church of the Holy Trinity, in the Decorated Gothic, was also partly demolished during the Civil War, but was restored by the countess of Pembroke, and again underwent renovation in 1854. The free grammar school was founded in 1548 by William Ermysted, a canon of St Paul's, London. The town has a considerable general trade. The population of the urban sanitary district (area 4245 acres) in 1871 was 6078 and in 1881 it was 9091.

Skipton was the capital of the ancient district of Craven. At the Norman accession it became part of the possessions of Earl Edwin, and was granted to Robert de Romille, who built the castle about the end of the reign of William. Subsequently it went to

the Albemarle family, but was again vested in the crown, and Edward II. bestowed it on Piers de Gaveston. In 1311 it came into the possession of the Cliffords. The castle was taken by the Parliamentary forces in 1645 and demolished in 1649.

SKITTLES. This English game, which somewhat resembles American bowls (see vol. iv. p. 180), was formerly known as *Kails* (Fr. *quilles*), and first came into vogue in England in the 14th century. Nine large oval-headed pins with flat bottoms, and made of a hard wood, are set up on a wooden frame, three pins square on each side. An angle and not an even side of the said square is presented towards the player, who stands at the distance of 21 feet. There may be one or two players a-side; and the object of each side is to knock down, or "floor," the greatest number of pins in the least possible number of throws, which are generally two or three, though they may extend to five, according to agreement. The roundish ball used for throwing weighs from 8 to 14 lb, and in fair playing only one step forward is allowed in delivery. A firm grasp should be taken of the ball in a slightly slanting position, so as to strike the fore pin on the shoulder and then reach the back ones. A player who clears the board in two throws may be considered a good all-round one. In different localities there are minor variations in playing the game.

SKUA,¹ the name for a long while given to certain of the *Laridæ* (see GULL, vol. xi. p. 274), which sufficiently differ in structure, appearance, and habits to justify their separation as a distinct genus, *Stercorarius* (*Lestris* of some writers), or even Subfamily, *Stercorariinae*. Swift of flight, powerfully armed, but above all endowed with extraordinary courage, they pursue their weaker cousins, making the latter disgorge their already-swallowed prey, which is nimbly caught before it reaches the water; and this habit, often observed by sailors and fishermen, has made these predatory and parasitic birds locally known as "Teasers," "Boatswains,"² and, from a misconception of their intent, "Dunghunters." On land, however, whither they resort to breed, they seek food of their own taking, whether small mammals, little birds, insects, or berries; but even here their uncommon courage is exhibited, and they will defend their homes and offspring with the utmost spirit against any intruder, repeatedly shooting down on man or dog that invades their haunts, while every bird almost, from an Eagle downwards, is repelled by buffets or something worse.

The largest species known is the *Stercorarius catarrhactes* of ornithologists—the "Skooi" or "Bonxie" of the Shetlanders, a bird in size equalling a Herring-Gull, *Larus argentatus*. The sexes do not differ appreciably in colour, which is of a dark brown, somewhat lighter beneath; but the primaries have at the base a patch of white, visible even when the wings are closed, and forming, when they are spread, a conspicuous band. The bill and feet are black. This is a species of comparatively limited range, breeding only in some two or three localities in the Shetlands, about half a dozen in the Feroes,³ and hardly more in Iceland. Out of the breeding-season it shows itself in most parts of the North Atlantic, but never seems

¹ Thus written by Hoier (circa 1604) as that of a Faroese bird (*hódie Skúir*) an example of which he sent to Clusius (*Exotic. Aucularium*, p. 367). The word being thence copied by Willughby has been generally adopted by English authors, and applied by them to all the congeners of the species to which it was originally peculiar.

² This name in seamen's ornithology applies to several other kinds of birds, and, though perhaps first given to those of this group, is nowadays most commonly used for the species of *TROPIC-BIRD* (*q.v.*), the projecting middle feathers of the tail in each kind being generally likened to the marinespike that is identified with the boatswain's position; but perhaps the authoritative character assumed by both bird and officer originally suggested the name.

³ It has long been subjected to persecution in these islands, a reward being paid for its head. On the other hand, in the Shetlands a fine was exacted for its death, as it was believed to protect the sheep against Eagles. Yet for all this it would long ago have been extirpated there, and have ceased to be a British bird in all but name, but for the special protection afforded it by several members of two families

to stray further south than Gibraltar or Morocco, and it is therefore a matter of much interest to find the Southern Ocean inhabited by a bird—the "Port Egmont Hen" of Cook's *Voyages*—which so closely resembles the Skua as to have been for a long while regarded as specifically identical with it, but is now usually recognized as distinct under the name of *S. antarcticus*. This bird, characterized by its stout deep bill and want of rufous tint on its lower plumage, has an extensive range, and would seem to exhibit a tendency to further differentiation, since Mr Saunders, in a monograph of the group (*Proc. Zool. Society*, 1876, pp. 317–332), says that it presents three local forms—one occurring from New Zealand to Norfolk Island and past Kerguelen Land to the Cape of Good Hope, another restricted to the Falklands, and the third hitherto only met with near the south-polar ice. On the western coast of South America, making its way into the Straits of Magellan, and passing along the coast so far as Rio Janeiro, is found *S. chilensis*, distinguished among other characters by the cinnamon tint of its lower plumage. Three other smaller species of the genus are known, and each is more widely distributed than those just mentioned, but the home of all is in the more northern parts of the earth, though in winter two of them go very far south, and, crossing the equator, shew themselves on the seas that wash the Cape of Good Hope, Australia, New Zealand, and Peru. The first of these is *S. pomatorhinus* (often incorrectly spelt *pomarinus*), about the size of a common Gull, *Larus canus*, and presenting, irrespective of sex, two very distinct phases of plumage, one almost wholly sooty-brown, the other particoloured—dark above and white on the breast, the sides of the neck being of a glossy straw-colour, and the lower part of the neck and the sides of the body barred with brown; but a singular feature in the adults of this species is that the two median tail-feathers, which are elongated, have their shaft twisted towards the tip, so that in flight the lower surfaces of their webs are pressed together vertically, giving the bird the appearance of having a disk attached to its tail. The second and third species so closely resemble each other, except in size, that their distinctness was for many years unperceived, and in consequence their nomenclature is an almost bewildering puzzle. Mr Saunders (*loc. cit.*) thinks that the larger of them, which is about the size of a Black-headed Gull, should stand as *S. crepidatus*, and the smaller as *S. parasiticus*, though the latter name has been generally used for the larger when that is not termed, as it often is, *S. richardsoni*—a name that correctly applies only to whole-coloured examples, for this species too is dimorphic. Even its proper English name⁴ is disputable, but it has been frequently called the Arctic Gull or Arctic Skua, and it is by far the commonest of the genus in Britain, and perhaps throughout the northern hemisphere. It breeds abundantly on many of the Scottish islands, and in most countries lying to the northward. The nest is generally in long heather, and contains two eggs of a dark olive-colour, suffused with still darker brown patches. Birds of either phase of plumage pair indiscriminately, and the young shew by their earliest feathers whether they will prove whole or particoloured; but in their immature plumage the upper surface is barred with pale reddish-brown. The smallest species, commonly known in English as the Long-tailed or Buffon's Skua, is not known to exhibit the remarkable dimorphism to which the two preceding are subject. It breeds abundantly in some seasons on the fells of Lapland, its appearance depending chiefly on the presence of lemmings (*Lemmus norvegicus*), on which it mainly preys. All these three species occasionally visit the southern coasts of Europe in large flocks, but their visitations are highly irregular. (A. N.)

SKUNK. The existence of the animal to which this name⁵ is applied was first notified to European naturalists as long ago as 1636, in Gabriel Sagard-Theodat's *History of Canada*, where, in commencing his quaint account of it (p. 748), he describes it as "enfants du diable, que les Hurons appelle Scangaresse, . . . une beste fort puante," &c. This fully shows in what reputation the skunk was then held, a reputation which has lasted to the present time, and has become so notorious that the mere name of skunk is an opprobrious epithet and can hardly be used in polite society.

The skunks, for there are several species of these animals, are members of the Meline or badger-like section of the family *Mustelidæ*, which contains also the

(Edmonston and Scott of Melby), whose exertions to that effect deserve the praise and recognition of all ornithologists.

⁴ It is the "Fasgadair" of the Hebrides, the "Shooi" of the Shetlands, and the "Scouti-allen" of the fishermen on the east coast of Scotland.

⁵ Probably derived from "Seecawk," the Crée name for the skunk. Another form given is "seganku."

martens, stoats, otters, &c., and forms the largest family of the *Arctidea* or bear-like division of the Land *Carnivora* (see the article MAMMALIA, vol. xv. p. 439-40, where the zoological characters of these groups are given in detail).

The common skunk (*Mephitis mephitis*) is a native of North America, extending from Hudson's Bay southwards to Guatemala in Central America. It is a beautiful little animal, about the size of a cat, though of a stouter and heavier build, with rich lustrous black fur, strikingly



Common Skunk.

varied on the back by a very variably shaped patch or streak of white. Its muzzle is long and pointed, its eyes sharp and bead-like, and its grey or white tail is long and unusually bushy.

The following account of the habits and disposition of the skunk is extracted from Dr C. Hart Merriam's *Mammals of the Adirondack Region, New York, 1884* :—

"The skunk preys upon mice, salamanders, frogs, and the eggs of birds that nest on or within reach of the ground. At times he eats carrion, and if he chances to stumble upon a hen's nest the eggs are liable to suffer; and once in a while he acquires the evil habit of robbing the hen-roost, but as a rule skunks are not addicted to this vice.

"Of all our native mammals perhaps no one is so universally abused and has so many unpleasant things said about it as the innocent subject of the present biography; and yet no other species is half so valuable to the farmer. Pre-eminently an insect-eater, he destroys more beetles, grasshoppers, and the like than all our other mammals together, and in addition to these he devours vast numbers of mice.

"He does not evince that dread of man that is so manifest in the vast majority of our mammals, and when met during any of his circumambulations rarely thinks of running away. He is slow in movement and deliberate in action and does not often hurry himself in whatever he does. His ordinary gait is a measured walk, but when pressed for time he breaks into a low shuffling gallop. It is hard to intimidate a skunk, but when once really frightened he manages to get over the ground at a very fair pace.

"Skunks remain active throughout the greater part of the year in this region, and hibernate only during the severest portion of the winter. They differ from most of our hibernating mammals in that the inactive period is apparently dependent solely on the temperature, while the mere amount of snow has no influence whatever upon their movements.

"Skunks, particularly when young, make very pretty pets, being attractive in appearance, gentle in disposition, interesting in manners, and cleanly in habits—rare qualities indeed! They are playful, sometimes mischievous, and manifest considerable affection for those who have the care of them. Their flesh is white, tender, and sweet, and is delicious eating.

"Skunks have large families, from six to ten young being commonly raised each season; and as a rule they all live in the same hole until the following spring."

We now come to the consideration of the remarkable and overpowering odour which has brought the skunk into such evil notoriety, and which is not the mere smell of the animal itself, as in the case of most other evil-smelling mammals, but arises from the, much-modified secretion of the anal glands. These glands, although present in all *Mustelidae*, are especially developed in the skunks, and are peculiar for being so entirely under the control of the animal that at ordinary times, as Dr Merriam has stated, the animal is enabled to be both cleanly and free from smell. The glands which secrete the odoriferous fluid are modifications of the ordinary anal glands possessed by nearly all *Carnivora*, but in the skunks they are enormously enlarged, entirely surround the rectum, and are provided with thick muscular gizzard-like coats. The two ducts leading from these glands open at the tips of two small conical papillæ placed just inside the anus, in such a position that by everting the anus the animal can protrude them externally, and with them can guide the direction of the jet of nauseous fluid, which is often propelled by the powerful muscles surrounding the glands to a distance of from 8 to 12 feet.

It is almost needless to state that the old stories about the skunk's smell arising from its urine, and of its splashing the fluid about with its tail are both entirely without foundation. The secretion itself is a clear yellowish liquid, with a marvellously penetrating ammoniacal and nauseous smell. So powerful and penetrating is this smell that Dr Merriam says, "I have known the scent to become strikingly apparent in every part of a well-closed house, in winter, within five minutes time after a skunk had been killed at a distance of more than a hundred yards," and under favourable conditions it may be distinctly perceived at a distance of more than a mile; instances are also on record of persons having become entirely unconscious after inhaling the smell. On the other hand it is said to act as a potent remedy in cases of asthma and similar diseases, but to most people such a remedy would be almost worse than the disease itself.

The other species of skunk are the following :—

The Long-tailed Skunk (*Mephitis macrura*), a native of central and southern Mexico, differs from the common species by generally having two white stripes along its sides, and by its much longer and bushier tail.

The little Striped Skunk (*Mephitis mitorius*), found in the southern United States, and ranging southwards to Yucatan and Guatemala, is much smaller than *M. mephitis*, and its colouring is of a very peculiar and striking nature, consisting of four interrupted longitudinal white stripes on a black ground, the general aspect of the animal being one of the most beautiful and striking in all this brightly marked family. Its skull also differs to such an extent from that of the common skunk that this species has been separated as a distinct genus under the name of *Spilogale*, but there is hardly sufficient reason for this.

Finally, the Conepatl (*Conepatus mapurto*), the skunk of tropical America, ranging from Texas to Chili and Patagonia, differs still more from the true skunks, although in colour it is almost precisely similar to the common species, varying in the same way and to the same remarkable extent in the relative development of the black and white. Its build is heavier than in *Mephitis*; its snout and head are more pig-like; and its nostrils open downwards and forwards instead of laterally on the sides of the muzzle. Its skull has many special characters, and its teeth are different in shape and, as a rule, in number also, the first minute premolar of *Mephitis* being almost invariably absent, so that its dental formula is only $i \frac{3}{3}, c \frac{1}{1}, pm \frac{3}{3}, m \frac{1}{1} - 32$.

For descriptions of the anal glands see Wyman, *Fr. Bost. Soc.*, l. p. 110, 1844; Warren, *Fr. Bost. Soc.*, iii. p. 175, 1851; Parker, *Ann. Nat.*, v. p. 246, 1871; Chittin, *Ann. Sci. Nat.*, [3], xix. p. 100, 1874; and for general descriptive accounts see Allen, *Bull. Harvard Coll.*, l. p. 178, 1869; Coues, *Fur-bearing Animals*, pp. 187-200, 1877; Merriam, *ut supra*. (O. T.)

SKVIRA, a district town of European Russia, in the government of Kieff, 77 miles south-west of Kieff, and 27 miles from the Fastova railway-junction. It is merely a big village, with 14,200 inhabitants, mostly engaged in agriculture, and has municipal institutions only as the seat of

the administration of the district. There is a considerable export of grain and cattle from the district, which is fertile and has many villages of from 3000 to 5000 inhabitants. In the 14th century Skvira was a far more important town than now, but the wars destroyed it, so that two centuries later it was left uninhabited; it was settled anew by Prince Róžinski, and the population slowly reached the number of 1000 by the end of the last century. The town has grown rapidly during the last ninety years.

SKYE, the largest island of the Inner Hebrides, Scotland, is situated between the mainland of Inverness-shire, within which county it is included, and the group of the Outer Hebrides. It lies between $57^{\circ} 1' 12''$ and $57^{\circ} 42' 30''$ N. lat. and $5^{\circ} 38' 50''$ and $6^{\circ} 47' 8''$ W. long. It is separated from the mainland at its eastern corner by Loch Alsh and Kyle Rhea, the channel at the narrowest point having a breadth of only about 3 furlongs. Southwards Kyle Rhea widens out into the Sound of Sleat, and to the west of Loch Alsh there is a sudden widening of the gap to the extent of about 9 miles. Along the eastern shore are the islands of Pabba, Scalpa, Raasay, Fladda, and Rona. The Minch separating Lewis and the mainland bounds Skye on the north, and the Little Minch to the north-west separates it from North Uist and Harris. The total area is 411,703 acres or 643 square miles. The coast-line is extremely irregular, abounding in inlets of a great variety of form and size, and in the north and west it is wildly precipitous. The island is naturally divided into three parts, each marked off by its distinctive geology and scenery. By much the largest division lies to the north of a line drawn from Loch Brittle to the head of Loch Sligachan. In this area the rocks are almost wholly varieties of basalt, disposed in nearly horizontal sheets, which give a singular tabular shape to the hills and terraced forms to the slopes. To the east of Loch Slizort are the basaltic groups which include the Storr Rock (2360 feet), with its curious columns, and the Quiraing (1774 feet), with its verdant platform in the centre of a range of rugged cliffs. In the north-west are Macleod's Tables (1801 feet) and some smaller summits. The central division may be defined along its southern border by a line drawn from Loch Slapin to Broadford. Its rocks are almost wholly of volcanic origin, and belong mainly to two groups, each characterized by its peculiar mountain outlines. The dark gabbros and dolerites form the jagged ridges of the Cuillins, and reach in Scuir-na-Gilleann a height of 3167 feet, and in Blaaven 3042 feet. To the north-east of the Cuillins tower in striking contrast the pyramidal Red Mountains, consisting of granite, syenite, quartz-porphry, and various allied rocks, and reaching in Glamaig a height of 2670 feet. The third division includes all the rest of the island, and consists of two tolerably distinct tracts. The more northerly of these lies along the base of the Red Hills, and forms the narrow part of Skye between Strathaird and Broadford Bay. It is composed mainly of Secondary rocks (Lias and Oolite), through which the eruptive masses of the Red Hills have been thrust. The more southerly part comprises the district of Sleat, and consists of red sandstone (Torridon sandstone or Cambrian), rising in Scuir-na-Coinnich to 2401 feet, and of various crystalline schists and quartzites which stretch from Loch Alsh along the Sound of Sleat to the southern point of the island. A considerable tract of limestone lies in the centre of Strath Parish, some of which has been altered by the eruptive rocks into a pure white marble. There are several inland lochs of considerable size, the largest being Loch Coruisk, remarkable for the gloomy grandeur of its situation in the heart of the Cuillins.

On account of the damp climate the land is better adapted for rearing sheep and cattle than for tillage. A large number of cattle

of the West Highland breed are grazed on the moors. The sheep are principally blackfaced, but some Cheviots are also kept. The greater portion of the inhabitants are crofters, who inhabit chiefly miserable huts with a fireplace in the middle of the floor, the smoke escaping by a hole in the roof. The number of crofts in Skye, according to the report of the Crofters Commission 1884, was 2051. The number of families ejected by decrees from their holdings between 1840 and 1860 was 5012, representing a population of 25,060, and between 1860 and 1883 1948, representing a population of 9740. Many of the crofters support themselves partly by fishing. In the Loch Carron and Skye district the number of boats in 1884 was 950, employing 2904 men and boys. From 20,627 in 1821 the population of Skye had increased to 23,082 in 1841, but by 1871 it had decreased to 17,330 and in 1881 to 16,889, of whom 16,099 were Gaelic-speaking. The number of females was 8903 and of males 7986. Portree, the principal town, has a population of 893.

See, besides the works referred to under HEBRIDES, Alexander Smith's *Summary of Skye*, 1865; Robert Buchanan's *The Hebridean Isles*, 1883; and *Report of the Crofters Commission*, 1884.

SLANDER. See LIBEL.

SLATE is an argillaceous rock of various colours—blue, green, purple, grey, and black—and a peculiar structure by which it readily splits into thin plates or laminae. It is of sedimentary origin, being primarily deposited on ocean floors as fine mud formed by the waste and denudation of pre-existing rocks, and afterwards compressed, hardened, and altered into compact rock. Slate beds occur mainly in the Cambrian, Silurian, and Devonian formations—frequently alternating with bands of grit and limestone, or interstratified with felspathic lava or ashes—and, being tilted up from their original horizontal or nearly horizontal position, stretch across wide districts in a series of undulations, which rise to the surface in crests, or dip into troughs underground and form angles of every inclination with the horizon.¹

Slate rock splits along cleavage planes which are distinct from and independent of original stratification. These planes are, as a rule, vertical or highly inclined, and intersect the lines of bedding at various angles, but some times coincide with them. The strike of cleavage is generally parallel with that of the slate beds, and a uni form direction is often maintained over wide areas, as in North Wales, where it is nearly north-north-east and south-south-west, while in Shropshire it is north-east and south-west, and in Pembrokeshire north-by-west and south-by-east. This peculiar cleavage structure is believed to be the result of a combination of intense forces, chiefly lateral pressure acting at right angles to the planes of cleavage.

Contraction, compression, shearing, and other powerful forces have caused great disturbances in slate beds, since they were first thrown down as fine sediment, and the results are seen in the foldings, contortions, fissures, rents, and dislocations that now exist. The fissures often follow well-defined courses and form divisional planes termed joints,—some running parallel with the strike and called strike joints, others running in the direction of the dip and called dip joints. Dykes of greenstone and other

¹ The following table shows the older sedimentary formations in which slate beds mainly occur, in the order of superposition :—

Primary or Palæozoic Rocks.

Permian. Magnesian limestone, marls, sandstones, &c.
Carboniferous. Coal measures, limestone, slate, &c.
Devonian. Old red sandstone, slates, &c.

Ludlow group.
Upper. Wenlock.
Upper Llandovery.
Lower Llandovery.
Caradoc and Bala.
Llandoilolo.
Lower. Arenig.
Tremadoc.
Lingula flags.
Menevian beds.

Cambrian. Cambrian grits, conglomerates, and slates.
Primitive crystalline rocks. Gneiss, schists, &c.

volcanic matter, and also veins of quartz, intersect the beds, and the surfaces of rents are frequently baked by heat ejected from the interior. Faults also occur, and cause displacements of the beds by upheaval or downthrow of one or other side of a rent.

Several varieties of clay slate are met with, and are characterized by the mineral that chiefly prevails. The colour—varying shades of blue, green, and purple being the most common—depends mainly on the presence of iron and the form in which it exists. The common roofing slate of commerce is generally fine-grained, and combines great strength and durability with moderate weight. It is also very dense, 1 cubic foot weighing over 170 lb, while according to Mr Wilkinson it takes on an average 20,000 lb to crush 1 cubic inch.

Certain varieties of slate, however, are soft and perishable, particularly the black carbonaceous kinds. Cubes of iron pyrites frequently occur in slate rock, and are generally deleterious owing to their tendency to decompose and fall out, but this is not always the case, as some of the most durable slates are sprinkled with pyrites without detriment.

The following percentage analysis of an average sample of Welsh roofing slate is given by Prof. Hull:¹

Silica.....	60.50	Magnesia.....	2.20
Alumina.....	19.70	Potash.....	3.18
Iron (protoxide).....	7.83	Soda.....	2.20
Lime.....	1.12	Water.....	3.30

Slate has been used for roofing during many centuries, and it is said that some of the old castles of North Wales—such as Carnarvon and Conway—were covered with this material. And no doubt the better class of houses, situated in the neighbourhood of slate beds, would be roofed with slates obtained by rough surface digging, or from blocks exposed by mountain streams and split by the action of the weather, long before regular quarrying operations commenced. The Delabole quarries of Cornwall had acquired considerable importance as far back as the 16th century, and some of the Welsh slate quarries are very old, as are those of Angers in France. But the slate industry belongs mainly to the present century and latter part of the 18th; and since the opening up of the country by sea and land communications the progress and development of slate quarries have been great and rapid. The largest and most valuable quarries of North Wales are worked in the Cambrian and Lower Silurian beds, those of Llanberis and Penrhyn being worked in the former, and the Festiniog quarries in the latter. Important quarries are worked in Cumberland (Lower Silurian), Westmoreland, and Lancashire (Upper Silurian), and also in Devon and Cornwall (Devonian and Carboniferous), the lake districts being specially noted for their rich green slates. Some of the western and midland districts of Scotland—mainly Argyleshire, Dumbartonshire, and Perthshire—produce very strong and durable slates (Lower Silurian and Cambrian), the largest and most important quarries being at Ballachulish in Argyleshire, where 15,000 tons are annually made. The Scotch slates are chiefly blue in colour, but thin beds of green are found in some of the central districts.

Slate is now almost universally used for roofing houses and buildings of every description, and for such purposes it is unequalled, the better sorts possessing all the qualities necessary for protection against wind, rain, and storm. The finer varieties are made into writing slates, and in districts where cross cleavage exists slate pencils are made. Slabs are also manufactured, and, being readily cut, planed, dressed, and enamelled, are used for chimney pieces, billiard tables, wall linings, cisterns, paving, tomb-

¹ *Building and Ornamental Stones of Great Britain and Foreign Countries*, 1872.

stones, ridge rolls, and various other architectural and industrial purposes.

Slate rocks are quarried both above ground and below ground, according as they lie near to or distant from the surface. When they are near the surface, and their dip corresponds with the slope of the ground, they are in the most favourable position, and are worked in terraces or galleries formed along the strike of the beds and having a height of about 50 feet. The galleries are generally carried on in sections of 10 yards, worked across the beds, and may rise to any height or be sunk below the surrounding level by excavations. When the rock is much removed from the surface, or inconveniently situated for open workings, it is quarried in underground chambers reached by levels driven through the intervening mass and across or along the beds. Or it may be necessary to sink shafts as in coal-pits before the rock is arrived at, but the cost of doing so forms a serious drawback. Inclines, waggons, tramways, and other machinery are employed in slate quarries as in other quarries, to suit the special circumstances and position of the operations, and need not be detailed.

The sections of a gallery are generally worked by crews of six men, who undertake to perform all operations of quarrying, splitting, and dressing at fixed rates. The rock is bored by jumper drills directed and turned by the hand and driven by hammers. When the bore is short and of small diameter one man can do the work, holding the jumper with one hand and using the hammer with the other. But when a large mass of rock has to be thrown down a bore 4 to 6 feet deep and a diameter of 2 to 3 inches is required and three men are employed,—one to guide and turn the jumper and two to drive it with heavy hammers. Bores of intermediate size are made by two men, one holding and the other driving the drill. When the boring has to be done on a steep face a staging is fixed to the rock or suspended from the top by means of ropes. The explosive generally used is rock-blasting powder, being the most suitable for the heaving force required to throw out or detach masses of rock without much splintering, which would destroy the blocks for slate making. Advantage is taken of the natural cuts or joints in blasting, as the rock is readily thrown or worked off these. From the mass thrown out by the blast, or loosened so as readily to come away by the use of crowbars, the men carefully select and sort all good blocks and send them in waggons to the slate huts to be split and dressed into slates. Two men are employed at this operation—one splitting and the other dressing, performing their work in a sitting posture. The splitter places a block on end between his knees, and with chisel and mallet splits it into as many plates as possible of the usual thickness for roofing purposes—namely, quarter of an inch more or less according to the size and strength required. These plates are then placed horizontally by the dresser on a vertical iron “stand,” and cut with a sharp knife into slates of various sizes suitable for the market (from 30 in. x 16 in. to 10 in. x 6 in.). Certain sizes are designated by names from the peerage, such as princesses (24 in. x 14 ins.), duchesses (24 x 12), marchionesses (22 x 11), countesses (20 x 10), viscountesses (18 x 9), ladies (16 x 10), &c. In every slate rock there is a large amount of waste or bad rock, which is thrown away as rubbish—the proportion of good to bad varying from one in twelve to one in thirty. Attempts are being made at present to have this waste material manufactured into some article of industrial value; and, as it consists chiefly of silica and alumina, these attempts should prove successful.

The slate industry of the British Isles is now of very considerable importance, that of North Wales in particular being immense. According to the census of 1881 the number of slate quarries in the United Kingdom amounted to 15,765, while over half a million tons of slates and slabs are produced annually, the value of which may be estimated at or over £1,250,000. The number of slates exported in 1884 exceeded 49 millions, the declared value being £251,824, of which over 35 millions went to Germany, valued at £163,321, over 5½ millions to Australasia, valued at £37,474, and over 3 millions to Denmark, valued at £34,304.

Good slate beds are also worked in the south of Ireland, particularly in the counties of Wicklow, Tipperary, Cork, and Kerry (Lower Silurian, Devonian, and Carboniferous). On the continent of Europe slate rock is worked in Devonian and other formations—in France (Lower Silurian and Devonian), Belgium, Sweden, Norway, Germany, Austria, and Italy (Oolitic). In North America immense slate beds extend from Newfoundland westwards to the Great Lakes and southwestwards to Arkansas (U.S.); and slate quarries are successfully worked in Newfoundland, Canada, and in the States of Maine, Vermont, Massachusetts, New York, Pennsylvania, &c. Writing and roofing slates and slabs of every variety of size and colour are manufactured in these; but none of the quarries have hitherto reached the immense developments of the principal ones in North Wales, and yet, with characteristic enterprise, roofing slates have been within recent years imported to Great Britain from Newfoundland and the United States. (D. C.)

SLAUGHTER HOUSE. See ABATTOIR.

SLAVERY

IT appears to be true that, in the words of Dunoyer, the economic régime of every society which has recently become sedentary is founded on the slavery of the industrial professions. In the hunter period the savage warrior does not enslave his vanquished enemy, but slays him; the women of a conquered tribe he may, however, carry off and appropriate as wives or as servants, for in this period domestic labour falls almost altogether on their sex. In the pastoral stage slaves will be captured only to be sold, with the exception of a few who may be required for the care of flocks or the small amount of cultivation which is then undertaken. It is in proportion as a sedentary life prevails, and agricultural exploitation is practised on a larger scale, whilst warlike habits continue to exist, that the labour of slaves is increasingly introduced to provide food for the master, and at the same time save him from irksome toil. Of this stage in the social movement slavery seems to have been, as we have said, a universal and inevitable accompaniment.

But wherever theocratic organizations established themselves slavery in the ordinary sense did not become a vital element in the social system. The members of the lowest class were not in a state of individual subjection: the entire caste to which they belonged was collectively subject. It is in the communities in which the military order obtained an ascendancy over the sacerdotal, and which were directly organized for war, that slavery (as the word is commonly understood) had its really natural and appropriate place. And, as war performed an indispensable function in human history, our just horror for some aspects of slavery must not prevent us from recognizing that institution as a necessary step in social progress. It is not merely that in its first establishment slavery was an immense advance by substituting for the immolation of captives, often accompanied by cannibalism, their permanent occupation in labour for the benefit of the victor. This advantage, recalled by an old though erroneous¹ etymology, is generally acknowledged. But it is not so well understood that slavery discharged important offices in the later social evolution—first, by enabling military action to prevail with the degree of intensity and continuity requisite for the system of incorporation by conquest which was its final destination; and, secondly, by forcing the captives, who with their descendants came to form the majority of the population in the conquering community, to an industrial life, in spite of the antipathy to regular and sustained labour which is deeply rooted in human nature, especially in the earlier stages of the social movement, when insouciance is so common a trait, and irresponsibility is hailed as a welcome relief. With respect to the latter consideration, it is enough to say that nowhere has productive industry developed itself in the form of voluntary effort; in every country of which we have any knowledge it was imposed by the strong upon the weak, and was wrought into the habits of the

¹ *Servus* is not cognate with *servare*, as has often been supposed; it is really related to the Homeric *εἰσπος* and the verb *εἶπω*, with which the Latin *sero* is to be connected. It may be here mentioned that *slave* was originally a national name; it meant a man of Slavonic race captured and made a bondman to the Germans. “From the Euxine to the Adriatic, in the state of captives or subjects, . . . they [the Slavonians] overspread the land, and the national appellation of the *Slaves* has been degraded by chance or malice from the signification of glory to that of servitude” (Gibbon, *Decline and Fall*, ch. lv.). The historian alludes to the derivation of the national name from *slava*, glory. See Skeat's *Etym. Dict.*, s.v.; see also SLAVS.

people only by the stern discipline of constraint. From the former point of view the freeman, then essentially a warrior, and the slave were mutual auxiliaries, simultaneously exercising different and complementary functions—each necessary to the maintenance and furthering the activity of the other, and thus co-operating, without competition or conflict, towards a common public end. In modern slavery, on the other hand, where the occupations of both parties were industrial, the existence of a servile class, instead of rendering the citizens disposable for social service in a different field, only guaranteed for some of them the possibility of self-indulgent ease, whilst it imposed on others the necessity of indigent idleness.

It was in the Roman state that military action—in Greece often purposeless and, except in the resistance to Persia, on the whole fruitless—worked out the social mission which formed its true justification. Hence at Rome slavery also most properly found its place, so long as that mission was in progress of accomplishment. As soon as the march of conquest had reached its natural limit, slavery began to be modified; and when the empire was divided into the several states which had grown up under it, and the system of defence characteristic of the Middle Ages was substituted for the aggressive system of antiquity, slavery gradually disappeared, and was replaced by serfdom, which again, with the rise of modern industrial life, gave way to personal freedom.

We have so far dealt with the *political* results of ancient slavery, and have found it to have been in certain respects not only useful but indispensable. When we consider its moral effects, whilst endeavouring to the utmost to avoid exaggeration, we must yet pronounce its influence to have been profoundly detrimental. In its action on the slave it marred in a great measure the happy effects of habitual industry by preventing the development of the sense of human dignity which lies at the foundation of morals, whilst the culture of his ideas and sentiments was in most cases entirely neglected, and the spontaneous education arising from the normal family relations was too often altogether denied him. On the morality of the masters—whether personal, domestic, or social—the effects of the institution were disastrous. The habit of absolute rule, always dangerous to our nature, was peculiarly corrupting when it penetrated every department of daily life, and when no external interference checked individual caprice in its action on the feelings and fortunes of inferiors. It tended to destroy the power of self-command, and exposed the master to the baneful influences of flattery. As regards domestic morality, the system offered constant facilities for libertinism, and tended to subvert domestic peace by compromising the just dignity and ruining the happiness of the wife. The sons of the family were familiarized with vice, and the general tone of feeling of the younger generation was lowered by their intimate association with a despised and degraded class. On social morality, properly so called, the habits of cruelty, or at least of harshness, engendered by the relation, had a powerful reaction. Hume observes on “the little humanity commonly observed in persons accustomed from their infancy to exercise so great authority over their fellow-creatures and to trample upon human nature. . . . Nor,” he adds, “can a more probable reason be assigned for the severe, I might say, barbarous manners of ancient times than the practice of domestic slavery, by which every man of rank was rendered a petty tyrant, and educated amidst the