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J. E. HARTING, F.L.S., F.Z.S.,

MEMBER OF THE BRITISH ORNITHOLOGISTS' UNION.

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ON THE HERPETOLOGY OF THE GRAND DUCHY OF BADEN.

By G. Norman Douglass.

(Continued from Zool. 1891, page 391.)

II. Fam. Bufonina.

1. *Bufo calamita*, Laur.—Considerably more numerous in the neighbourhood of Karlsruhe than the following species, though less commonly met with during the daytime. The proportion must be about ten *calamitæ* to every four *vulgaris*, and one may frequently count up to twenty of the former before seeing a single Common Toad. The dry soil of the "Hardwald" seems more congenial to it; and the great abundance there helps, possibly, to explain the absence of *B. variabilis*, as it appears that these two tend to exclude each other, and rarely to occur in equal numbers.

The specimens from this district are of larger dimensions than English ones. The colouring is often fairly bright, in consequence of the red tint of the warts on the back (chiefly with the female sex); the fundamental tone varies between dark brown and light greyish-green. Some individuals of the latter form might easily be mistaken in the twilight for *variabilis*, especially as the dorsal groove is here not so clearly defined.

The possession of these spinal lines, or stripes, is a common trait with vertebrate animals—*cf.* many of the Mammalia; the vertebral zones and crests in lizards, newts, and in the embryonic stage of fishes, of which latter a rudiment is retained throughout life by the *Salmonidæ;* and, being traceable to the earliest condition of all vertebrates, possesses a deeper morphological significance than the other markings.

The Natterjack is found, I believe, in every other part of the Grand Duchy, as well as in all the neighbouring countries. Its range does not extend so far south or east as that of *B. variabilis*. In the Palatinate it is reported as "not very common:" I captured a single specimen, in broad daylight, near Wörth on the Rhine.

2. *B. vulgaris*, Laur.—This is, together with *Rana fusca*, the most widely diffused batrachian of Baden, being found in every altitude and situation.

In point of size, it seldom exceeds medium dimensions, and never attains the vast proportions of some Swiss or Austrian, to say nothing of Italian, specimens. As with other species protected by obscure colours, there are here no marked varieties. Some

individuals may be found indistinctly striped (not so frequently as in England or Scotland); in others the excrescences on the back are of an unusually dark brown tint.

Towards the middle of April there are generally one or two pairs in the fountain of the Schlossgarten, and other ponds near Karlsruhe; while large numbers congregate in more suitable localities, such as that mentioned in the account of *R. arvalis*. In the Black Forest I have seen them in pools of melting snow, and it reflects credit on their constitution that they can survive a prolonged immersion into water of the temperature of ice. But most recently it has been shown that though frozen into solid blocks, their ultimate recovery is ensured, if a slow and judicious process of thawing be adopted.

There is some fluctuation in the numbers of this species: in some years it is comparatively rare, in others exceptionally common. The latter was the case in 1887. A similar periodical abundance has been recorded with other anurous batrachians, and may be attributed in chief part to moist weather favouring the development of the spawn at the critical moment. For whereas one or two species display considerable forethought in selecting deep water to deposit the spawn, others are most improvident in this respect,* and content themselves with the first piece of water that comes in their way. Hence large quantities of spawn must perish annually, if a sudden drought sets in.

Occasionally, in dry weather, batrachians will undertake journeys across country in search of water. I have noticed this principally with *Bombinator bombinus*, which, through establishing itself in the most shallow and ephemeral puddles, is often obliged to change residence. An emigration of *Rana esculenta*, on a more wholesale scale, has lately been recorded, and, according to an American journal, there can be witnessed, in Dakota, an annual procession of frogs marching from the Red River (winter quarters) to the prairies in summer, and back again in autumn.

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* It is not surprising to find this same lack of intuitive instinct with birds. As an instance which has come under my own observation:—During a spell of unusually fine weather, a number of Reed Warblers on the River Alb, near Karlsruhe, were tempted to build their nests long before the reeds were of sufficient height. The consequence was that they were all destroyed by a sudden flood, with one exception, where the bird heroically hatched its brood, though the nest was covered with thick mud. In this and most cases the catastrophe was unexpected; in others it appears as if repeated sad experience will not effect the discontinuance of a habit formerly justified

The quantities of small frogs aud toads sometimes seen covering a large extent of ground has given rise to the notion that they have been rained down from the clouds, whereas, in all probability, the explanation given long ago by Roesel is the correct one, *viz.*, that a sudden rainfall has caused them to quit the fissures of the ground, where, before, they had been sheltering from the dryness. In an old work of the seventeenth century, by one Gasparus Schott, a Jesuit professor, the author gives his views on the subject:—"Ranas ex putre pulvere* & imbre nasci notum est omnibus, ut ipsemet non semel vidi"; and, later on, "Cum ipsâ subinde pluviâ decidunt, in nubibus generatæ. Testes habeo oculatos, imò et oculos meos!" But he does not always trust to his own powers of observation. Thus, after discussing at great length the vexed question whether the Salamander can exist in fire, and weighing the probabilities on either side, he comes to the conclusion:—"Salamandra *aliquamdiu* in igne vivit,—at deinde moritur."

It has been observed that the young of this and other nocturnal batrachians display much more agility, in various ways, than the adults. When it is found that, in addition to this, they lead a diurnal—*i. e.* more natural—life, we are led to consider whether the ancestors of the race have not been forced, in the course of time, to assume their present concealed habits, presumably for the sake of protection. The colour affords further confirmation of this hypothesis: there has been a simultaneous acquisition of nocturnal tints in place of the original brighter ones now confined to the immature condition. Their present sedentary mode of existence has therefore resulted in a partial muscular atrophy, similarly as unwonted exercise will induce hypertrophy of parts.

In this and many other instances a more systematic study of the ontogenetic development would doubtless yield much evidence of the gradual differentiation, through increased use or disuse, of allied races. This is certainly one of the most fertile provinces of Natural History, and, being comparatively unexplored, offers special attractions to the biological speculator. It is seen that the young of many species possess a greater variety of capacities,

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* This is akin to the idea expressed by some peasants in the Auvergne, who, misled perhaps by external resemblances, imagine that the Viper is formed spontaneously out of the dung of horses and cattle.

a more diversified adaptability, than the adults. At the same time the young of forms highly specialized often do not exhibit, to any pronounced degree, the distinguishing features of their parents.

Clearly, under changing external conditions, some amount of flexibility during growth is as essential to the species as it is to the individual. This flexibility differs both as to degree and direction (quality), and is manifested in what may be called their respective characteristic tendencies. Having attained maturity, the race, like the individual, has become more specialised in its mental and physical constitution. But the acquired comparative rigidity, while affording protection against temporary shocks which might have proved fatal during growth, constitutes in itself the primary cause of incipient decay.

3. *B. variabilis*, Pall. — Much remains to be done before the distribution of this species in the Grand Duchy is anything like accurately determined. Judging by the accounts from the countries surrounding Baden, whose Herpetology has been more thoroughly investigated, we should expect it to be pretty universally distributed here, as it occurs, more or less abundantly, in all of them.

I have been unable to find it in the vicinity of Karlsruhe, and should be careful in crediting statements of its existence not capable of ocular demonstration, as there is much confusion between this and the two foregoing species. It is said to occur as near the capital as Ettlingen (five miles south), and again at Heidelberg; Leydig cites it from Weinheim in the north.

In the Palatinate *variabilis* appears to be very common near, and in, the towns of the Rhine Valley. It has been recorded from every part of Germany, though it seems to be absent, or very rare, in certain districts.

I was surprised to come across this species in the island of Lipari, during a short stay there in the early spring of this year. The tadpoles were abundant in the three rivulets of warm mineral water which run down to the sea on the western part of the island (Prof. Giglioli has kindly written to say that he also found it there in 1878). How it reached this volcanic island, destitute of fresh springs, and has succeeded in establishing itself there, is at present a mystery.

At the time of my visit all animal life was very poorly represented, owing to the stormy weather; still I venture to append

what I was able to observe in the way of Herpetology.* The lack of accommodation in these islands is the chief drawback to tourists; and I will take this opportunity of again thanking Mr. Narlian, of Lipari, for his kind hospitality during my stay there.

(To be continued.)

NOTES AND QUERIES.

MAMMALIA.

The Marten in Norfolk and Suffolk.—Referring to Mr. Harting's criticism of the opinion I ventured to express (Trans. Norf. and Nor. Nat. iii., p. 668), that the recent examples of this species obtained in Norfolk must be regarded as "escapes," and to my suggestion that it was possible —as in the case of the Irish Martens which had escaped from confinement in the South of England—for these accidental liberations to happen without the fact being suspected, I fear that I have been misunderstood, as it certainly was not my intention to imply that the isolated occurrences here met with were individuals which had escaped *in the South of England*. I merely mentioned that circumstance to show such a thing had occurred, and that a parallel case might happen here quite unsuspected. That the Kelling and Hevingham Martens were not native Norfolk animals I think Mr. Harting's remarks go far to render probable, for I quite agree with him, to use his own words, that "there are so many keen naturalists and observant sportsmen in Norfolk that it would be very difficult for any escaped Martens to be at liberty without the fact becoming speedily known," and that is precisely what I believe happened in the cases referred to; how much more

* Of snakes, only *Zamenis viridiflavus* was observed on Stromboli and the islet of Basiluzzo (the young already decidedly *carbonarius*), but it undoubtedly also occurs on the larger islands of Lipari, Vulcano, Salina, and Panaria. Light-coloured ones—*Tropidonotus* ?—are reported to exist on Lipari.

[The colour-perception of the islanders is not highly developed. Anything light is *bianco*, dark *nero*.]

L. muralis tiliguerta, dark on Stromboli and Vulcano, light on Lisca Bianca; varying according to the soil on Lipari, where a fine *rubriventris* race may be met with near Bagno Secco. I could not detect it on Lisca Nera, which, I was afterwards told, is swept over by heavy seas; but the hazardous climb up this rock was rewarded by the discovery of a nest of *Larus cachinnans*, Pall., on the summit. The most brightly coloured and largest *muralis* are to be seen on Panaria. Curious to say, this lizard is less shy in the neighbourhood of villages than on the larger islands off the beaten track, and quite unapproachable on the small islets.

Panaria seems also to be the Eldorado of geckos (*Platydactylus*), where in summer their numbers are said to be quite appalling. They are known as "Salamide," and are reputed highly poisonous. This species occurs on all the larger islands, while *Hemidactylus verruculatus* exists on Basiluzzo, Dattilo, and, presumably, all the other islets.

ON THE HERPETOLOGY OF THE GRAND DUCHY OF BADEN.

By G. Norman Douglass.

(Continued from p. 19.)

III. Fam. Pelobatidæ.

P. fuscus, Laur.—A comparatively rare batrachian, of nocturnal and secluded habits. I have never had the fortune to come across it during its sojourn in the water, or to discover the large larvæ in any of the ponds annually visited.

The sole locality as yet cited for its occurrence in the Grand Duchy is Mannheim (Nüsslin).

The absence of this species in Switzerland may account for the fact that it has not been observed in the southern parts of the Duchy, but as it has been found at various points of the east, north, and west of Baden, sometimes not far from the frontier, it will probably turn up eventually in the northern or north-eastern districts.

IV. Fam. Hylidæ.

H. arborea, L.—This species is not rare along the Rhine, though more frequently heard than seen. Near Karlsruhe there is only a limited, always decreasing, number of localities convenient for hybernating and depositing the spawn, and since a favourite piece of marshy ground, at the N.W. extremity of the "Exercierplatz" has been drained, the numbers of this frog have suffered a perceptible decrease. In the course of four summers I have only come across some four to six specimens—a very poor average in comparison with most parts of Germany. Round the shores of Lake Constance it is commoner, and also, I believe, in the south-western portions of the Grand Duchy. It prefers the level country to the hills, and is not found at anything like the elevation at which it occurs in the Tyrol and Switzerland (3000–4000 ft.).

The action of the chromatophores is very rapid with this batrachian, and experiments have proved the remarkable susceptibility of the eye to colour, enabling it to assume a protective resemblance in brief time. Thus it becomes brown on the ground, mottled on trunks of trees, &c.

In a stone-quarry near Cette (S. France) I was struck by a *Hyla* whose upper surfaces, of a rich gold colour with small, darker speckles, were wonderfully adapted to the limestone block on which it was sitting. Curious to say, another one, on a rock of the same colour, was of the usual rich green tint. I presume the eyes of the latter were shut at the time, and the adjustment of the colour therefore impossible.

It is also sensitive to atmospheric changes, and more so to moisture and dryness than to actual heat or cold. An individual brought from the Rhine-woods one afternoon to the drier air of the capital changed the same evening to a dark green; next day the colour was grey with small light spots, and afterwards it became dark brown with yellow blotches. The skin had also become rough and leathery—a condition which might be taken to indicate complete prostration of the nervous system, and a temporary reversion to ancestral colours. During a rainy night it changed to its original smooth green appearance.

Such observations will have been made by everyone who has kept this species in confinement, but they lose some of their value when it is remembered that the colour is equally affected by desquamation, change or lack of food, light, mental depression and ill-health of every sort, and that, besides, different individuals vary in this respect. Hence it is generally impossible to decide to what influence the change of colour, in most instances, is due. To obtain anything more than a superficial knowledge of the action of these different agents would require a long series of experiments, pursued on a more systematic basis than has hitherto been attempted.

V. Fam. Discoglossidæ.

1. *Alytes obstetricans*, Laur.—This is most probably a French immigrant. It was first observed in the western districts of Germany (Lower and Middle Rhine, Westphalia, Eifel, Nassau, valleys of the Moselle, Saar, Nahe and Lahn), but is now being discovered in various Central and Northern parts of the country (Hartz Mountains, Brunswick, Hanover).

Its distribution in Baden is not determined as yet. Bonaparte notes its occurrence at Mannheim, Nüsslin at Freiburg. If it reached this point from the northern cantons of Switzerland, as is quite likely considering its abundance there, there is reason

to expect that it will be found in other parts of the Grand Duchy in course of time. For it is only natural that all rarer species should first be signalled from the neighbourhood of University or other large towns—such as Freiburg, Bonn, Berlin, Strassburg —on account of the larger number of collectors and students living there.

I have heard the flute-like notes of *Alytes* in the vineyards near Oberschaffhausen (Kaiserstuhl), but not near Karlsruhe. At the Laacher See, in the Eifel, I searched in vain for it under blocks of lava, &c., but the season (first week of April) may have been too early for this locality.

2. *Bombinator bombinus*, L. — Universally distributed in Baden and the Bavarian Palatinate, and common enough near Karlsruhe (Wildpark, Durlacher Wald, &c.), as well as in all the ditches—muddy by preference—on the level ground and hills. At Eggenstein it occurs in the same locality with *Bufo vulgaris*, *Rana arvalis*, *fusca*, and *esculenta*.

I mention this because I have twice had an opportunity of noticing that where the area is more restricted and there are several unconnected ponds, the last-named frog and *B. bombinus* keep apart, as though disliking each other's company. They certainly occur promiscuously where there is no choice; but judging also by other facts, this enmity may be due to the acrid secretion in the skin of one species being distasteful to the other.

This fluid, with *B. bombinus*, is developed chiefly on the lower surfaces, and connected with the bright warning colour which the animal takes care to display by turning over on its back. This curious habit seems to have been accidentally acquired, perhaps from hurrying and stumbling when pursued, and, pending its general adoption, that part of the body, to judge by the colour of the young, has been rendered more conspicuous. Conversely, the upper parts are tending to lose their darker markings; for, when it thinks itself unseen, it will sit motionless, only showing the back, the colour of which is highly protective.

Many of these attitudes, originally merely the result of fright, have been gradually improved upon, and pass imperceptibly into those of feigning death. Some batrachians, on being alarmed, suddenly draw in all their legs, presumably to present the appearance of an inanimate object; others heighten the effect by

assuming curious contortions, like many newts and the species in question, and can be observed to bend their spine inwards, covering their eyes with their feet.*

From this class of devices the transition to those directly calculated to inspire terror is again so gradual that it is often difficult (for us) to decide what impression some of them are intended to convey. Examples of this method are comparatively rare among the Amphibia. I will only refer to *Rana arvalis*, which, more than the other frogs, is fond of inflating itself with air, no doubt in the hope of imposing by its size. Judging by a large number of individuals, I gather that the females are more addicted to this habit.

It is doubtful whether *B. igneus*, Laur., will ever be found in Baden. "It is certainly absent in the whole river-system of the Rhine above Bonn, and its existence on the lower Rhine is still very doubtful, whereas *B. bombinus*, this "typical mountain form, appears solely as perpetual resident of the plain in the upper valley of the Rhine (*i. e.* Baden), and seems here to take the place of *B. igneus*" (Wolterstorff, 1890).

Order II. Urodela.—Fam. Tritonidæ.

1. *T. cristatus*, Laur. (*cuclocephalus*, Fatio).—"Generally distributed, but not common," is said of this newt in most local faunas of Germany. The same applies to Baden. I have been informed of its occurrence in most parts of the country, except the higher ground of the Black Forest, but never in great numbers. At Karlsruhe a pair or two may usually be seen in a pond near the entrance of the Wildpark, where I have obtained pretty specimens of the *carnifex* stage: I have caught it in other ponds there, in the Durlacher Wald and various places. In the Palatinate it is considered "not very abundant."

The conditions of the country seem suitable to *cristatus*, and it attains full size (16 cm.) and bright colours. I have observed a

* "Comme pour ne point voir le danger," says Fatio. Or perhaps to conceal their brilliancy? It would be impossible to overrate the importance of such an item, considering the enemies with which many protective species have to deal. The Woodcock, for instance, is often betrayed solely by its eyes. Darwin's Patagonian lizard, "when frightened, flattened its body, closed its eyes, and then from its mottled tints was hardly distinguishable from the surrounding sand." But this movement may be purely instinctive.

slight tendency towards greenish tints in the spring costume of the male, but otherwise the coloration has always been normal. The crest varies individually in height, and by far the finest I have seen in this respect were caught in the so-called "Badloch," on the Kaiserstuhl.*

These crests are sometimes jagged and torn, perhaps from passing through the branches of brambles, &c. (such as often obstruct ponds), where they must be rather a hindrance.

But I am told they are useful as a protection against pike and other fish, which dislike the look of the serrated edge. A somewhat similar instance is that of the male Minnow enjoying a temporary immunity, as I am assured, from the attacks of larger fish, which perhaps have unpleasant recollections of the Stickleback, and are suspicious, at this season, of the family (?) likeness. I have not settled either of these points to my own satisfaction, but analogous examples show that many ornamental characters would not be so highly developed unless serving, at the same time, for practical purposes.

This applies to the ocelli of certain butterflies ('Tropical Nature,' 1st ed. p. 202), to the horns of stags, rattle of the Rattlesnake, and other structures; as well as to many of the secreting glands in various classes of animals. The voice, too, is generally of use in more ways than one, though, as we descend the scale, its functions and expressions naturally become less complex. It is absent, as a rule, among reptiles. Still there are exceptions, and J. v. Fischer, writing of that of the Gecko, distinguishes between the (original?) call-note heard during the breeding season and the other tones employed under the influence of fright, pain, or anger. The South European *Tropidosaura* is likewise gifted with a powerful voice, the possession of which would seem hardly advantageous to an animal of its habits, did we not know, on the authority of the same writer, that its arch-enemy, *Coronella girondica*, "lets it drop on the first scream."

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* I cannot sufficiently recommend this locality to the notice of the many English naturalists who pass through Freiburg. For mineralogists it is probably unique, and without mentioning any of its special attractions, I may refer them to Prof. Knop, of Karlsruhe, who has visited this district annually for the past twenty-six years, and is most obliging in giving information of all sorts. Owing to its peculiar soil and situation, the plant and insect life are also highly interesting.

No wonder that, until observations such as this are forthcoming, the utility of certain characters is frequently called into question.

2. *T. palmatus*, Schneider.—Doubtless more widely diffused than is at present known. The localities already given for Baden are Heidelberg, Herrenwies, Mummelsee, and Freiburg; to which I can add Rippoldsau, and Allerheiligen, both in the Northern Schwarzwald, and well known to tourists. At the latter place I obtained great numbers in a small rill near the Convent, together, in about equal proportions, with *T. alpestris*. I also captured *palmatus* in the Glottenthal near Freiburg, in the same pond with *T. tæniatus* and *cristatus*, but nowhere in the Rhine Valley, nor yet at Grünwettersbach on the hills near Karlsruhe, where it is said to be found.

Coloration and size of Baden specimens agree with those from other parts of the Continent. The length never exceeds 10 cm., generally ranging between 6—8 cm. The females (from the same localities) vary in ground-colour from dark brown to greyish green; in a single case the under surfaces were pure white, instead of yellow.

During the summer months this sex bears such a close resemblance, in its obscure tint and emaciated condition, to others of *T. tæniatus*, that it is well to remember that the absence of pigment on the throats affords, as Mr. Boulenger has pointed out, the easiest criterion of its identity.

Having occasion to keep large numbers of this species in confinement, I was able to corroborate what others have observed with respect to its voice. This consists in a short, abrupt tone, but whether it is produced under the water or on coming to the surface to breathe, I could not say, as the animals were purposely kept out of the light.

The distribution of this species in Germany has been dealt with in a special enquiry by Prof. Leydig, to which I may refer those who are interested in the subject ('*Triton helveticus und Rana agilis*.' Würzburg, 1888).

3. *T. tæniatus*, Schneider.—This newt is about as common as the next species; for though not occurring, like it, on the highest points of the Schwarzwald, it is more abundant near the Rhine. No doubt its numbers here are kept down, to some extent, by a variety of enemies, preying chiefly upon the larvæ.

On the Kaiserstuhl, it is found near the "Badloch," inhabiting the tepid water which issues from the small excavation there.

In the Palatinate it is as generally distributed as in Baden.

With respect to coloration, I have only noted one male, from Karlsruhe, as peculiar in possessing two perfectly symmetrical rows of spots on the lower surfaces, instead of the irregular black blotches. The five converging stripes on the head show an interesting tendency to unite, recede towards the parotides and form an almost vertical pattern. This manner of development has many analogies in the animal kingdom, to which I hope to recur elsewhere at more length. The young, generally to be found under stones and such like, display a great variety of fundamental tints, from light brick-red to the darkest brown.

The proportion of the sexes seems less equal than with *T. alpestris;* at least, one often sees several males of this newt courting one female, whereas *alpestris* is, as a rule, to be found in pairs.

4. *T. alpestris*, Laur.—It will have struck anyone who has examined the fauna of Karlsruhe during the last few years that this newt has become more common, while *tæniatus* has proportionately decreased.

It is interesting to observe this tendency towards mutual exclusion, but we are generally at a loss to conjecture in what the advantages may consist which decide the day; for to attribute the ultimate victory of one of the contending parties to "greater flexibility of constitution, &c.," is doubtless true of most cases, though it contains little more than a re-statement of the fact. The context waxes hottest between those whom a physical similarity—relationship, in most cases—involves in the only too natural warfare; whether they be genera and genera, species and species,* or the variety and individuals of one species respectively. Whatever may be the cause of the displacement

* To the large list of analogous observations among birds I may be permitted to add two more examples. Within recent years, *Phylloscopus trochilus*, at one time very abundant near Karlsruhe, has been completely replaced by *P. sibilatrix*, so that these two now occur in exactly inverse proportions. Similarly, *Parus cæruleus* is increasing rapidly, whereas *P. cristatus* becomes rarer every day. In explaining the last case, no doubt the more enterprising disposition of *cæruleus*—witness the social success of the Sparrow—must be taken into account.

here, it is evident that *alpestris* possesses some capabilities enabling it successfully to invade a region to which it is not entitled by name.

I have missed this newt in the immediate vicinity of the Rhine, but, with this exception, have found it at every level up to the summit of the Feldberg. In the Alps it occurs at a still higher elevation, as I caught one in some water near the top of the Splügen Pass (Fatio gives "about 2500 mètres," Gredler 6500 (German) feet as the highest point of its occurrence). It is found throughout Germany, though sometimes not abundantly.

I have observed nothing remarkable about the colour of Baden specimens, except that the throat in some, perhaps younger, males, is as much spotted as with the females; but there are one or two other points I should like to notice.

In the first place, one may come across (in summer) specimens of *alpestris* whose eyes are devoured by the larvæ of some fly, probably *Lucilia sylvarum*, Meig. (Zool. Anzeiger, 1891, p. 455). It would be interesting to know whether the other newts are free from this parasite, and why, if this is due to their more aquatic life, some terrestrial batrachians, such as *Rana fusca*, appear equally exempt from its attacks.

Again, I once caught a female of this species, near Karlsruhe, with as distinct a crest as the male. This is a pretty frequent phenomenon among some mammalia and birds, but I only recollect one other instance with the *Urodela* (Leydig, 'Molche d. Württ. Fauna,' p. 39), though it occurs again commonly enough among lower animals.

Further I may call attention to the fact that most European species of this order, when entering upon their land life, assume either much brighter or much duller colours. I have certainly found *T. alpestris*, in the Alps, as brilliantly coloured in August as in spring, and it was this circumstance which suggested to me the possibility that the brighter tints of others at this late season may have been developed as warning colours, while the obscurer shades of the majority are protective. Without wishing to draw a general inference from a few cases, I may note, as bearing on the point, that the Marmorated Newt, on leaving the water, becomes "much more brilliantly coloured" than before, and that a similar acquisition of brighter tints takes place with the young Salamander (*cf.* also *Chioglossa lusitanica*) on definitely quitting

this element. The vivid hues of *Bufo variabilis* are not, as might be supposed, characteristic of the breeding season, but are only acquired later—"*variabilis*"—on the land; and it may be worth mentioning that the exceptionally acrid fluid in the skin of this species is, as with *S. maculosa*, confined, like the colour, to the upper surfaces. At all events, I venture to think that, in view of the increased interest now taken in questions of colour, this point is deserving of notice.

II. Fam. Salamandra.

1. *S. maculosa*, Laur.—Plentiful throughout the whole length of the Grand Duchy, except in the woods of the Rhine Valley, where, to the best of my knowledge, it never occurs. I have obtained it in numbers from the wooded hills near Karlsruhe (Rittner-wald, Ettlingen), and throughout the Northern Black Forest. It seems here more abundant—especially in the Murg Valley—than in the southern and higher districts of the Feldberg. Often, as with *S. atra*, one finds large companies collected together at one point, and may then walk a long way before seeing another specimen. This comes, I fancy, from their all having crawled out of the same retreat prior to separating in different directions, and not from any gregarious or patriarchal disposition. I have not met with this species on the Kaiserstuhl, where several peasants assured me of its existence. This would be an interesting point to determine, as implying an emigration from the Schwarzwald across a stretch of level country; unless, indeed, it had been purposely liberated there. It is also universally cited for the Palatinate, but must be considerably rarer than in Baden, as I never saw it in any part of the country, in spite of the most propitious weather (five days of uninterrupted rain). It occurs throughout Germany in suitable localities, *i. e.*, damp and wooded hills, avoiding the cultivated plain and vineyards.

Baden specimens frequently attain the unusual length of 20 cm. The yellow of the spots varies in intensity between light lemon and dark orange. It has been observed that the exclusion of light renders these markings paler and less clearly defined, but there are individual variations irrespective of this cause. The fundamental tint is also of different shades from dark brown to bluish black. The markings seldom develop into the cross-

barred pattern, commoner with southern forms, but tend rather to become longitudinally confluent along the back. Very pretty specimens of this type may be found, though the continuity of the lines is broken on the tail.

I have never come across the Salamander after the beginning of October, and only once succeeded in unearthing three individuals, in close proximity to each other, during the winter. The coloration was as bright as in summer, and they were not long in regaining their habitual liveliness. My earliest date for their spring appearance is the first week of April.

It is a singular fact that the young of a certain size—from 5 to 10 cm.—appear to be much rarer than the adults, and I do not know that anyone has ventured an explanation of this. Is it that their habits are more nocturnal?

The larvæ are extremely abundant in all the shaded streams and springs of the hills. While they are being deposited, the females are sometimes carried away by the current, a misfortune which may entail disastrous consequences, unless they are drifted ashore again by a kindly wave. Similar accidents may take place during their summer rambles, if they happen to step into a half-empty cattle-trough or other hopeless situations. I have discovered *S. atra* in the same predicament, feebly struggling to keep its head above water.

Some of these larvæ are very light-coloured, in fact, almost white and transparent. Their egg, however, is always furnished with colouring matter. This paleness is probably the result of deficient nourishment, as has been experimentally shown by Fatio ('Faune des Vertèbres de la Suisse,' p. 579) in the instance of *Triton palmatus*. But these larvæ of *Salamandra* are no doubt constitutionally weaker, and must stand a poor chance of surviving and regaining their strength, in view of the severe struggle for existence among them.

Triton alpestris has been observed "more or less albinotic" in alpine lakes, but, from my experience, the light appearance of some of these newts *in the water* is due to the semi-detached and translucent epidermis.

Among reptiles and batrachians in general the tendency to this condition is comparatively rare: cases have been recorded with *Coronella lævis* (2), *Elaphis flavescens*, *Tropidonotus natrix* (2), *T. tessellatus*; *Alytes obstetricans*, *Bombinator bombinus*, *Hyla*

arborea, Rana fusca, Salamandrina perspicillata, Triton cristatus [?], and doubtless several more.*

White coloration is not, *eo ipso*, a pathological condition, unless accompanied by lack of pigment in the choroid lining and iris, which constitutes total albinism, and entails debility of various sorts. In every case its injurious effects are relative, dependent both on the climatic and social circumstances in which the affected individual is situated.

Like melanism, albinism, in so far as it denotes a diminution, however slight, local or universal, of the *normal* pigment, is due to a variety of causes. It is incidental to both sexes and all ages. Besides varying in degree, it differs also as to nature, being either temporary or permanent, congenital or acquired, sometimes hereditary, &c.,—distinctions whereby it has become entitled to various specific names. Being founded on a physiological diagnosis, these will apply equally to all species liable to the many forms of deficient pigment; but I venture to think that until some definition of the broader term "albinism" is adopted, most of the discussions on the subject will remain, so to speak, at cross purposes.

The majority of the cases above cited were *albinismus universalis*. A large proportion, nevertheless, belongs to that intermediate type, a few instances of which are on record with our own species—fair-complexioned negroes—under the name of "semi-albinism." I should retain this term in preference to "xanthous varieties," as several writers have employed the latter to designate a not *abnormal* condition (blonde type of European). Still, it is rather vague, and not as descriptive as the corresponding "phæism." *Albinismus partialis* (pied varieties), so frequent among warm-blooded animals, has not, to my knowlenge, been observed with reptiles or batrachians.

I am unaware of the existence of any data showing the proportion of the sexes among albino animals, but have no hesitation in predicting that the females will be found in the

* In a paper by Dalla Torre on the 'Drachensage im Alpengebiet,' there is a note to the effect that one of these fabulous monsters, on being killed, "was found to have ten young ones in its body, one of which was quite white.' Such a detail can hardly be ascribed to pure imagination, and supports the view that the origin of these myths must be sought, to a large extent, in the fauna of the country.

minority, seeing that this sex, in variability of every description, is less inclined to depart from the mean.*

2. *S. atra*, Laur. — I would not refer to this strictly alpine species, but for misleading accounts of its existence in the Schwarzwald and elsewhere, which anyone interested in the fauna of the country is sure to hear. These may be safely attributed to errors of identification with *Triton alpestris* in its terrestrial costume.

The nearest point of its occurrence on this side of the Rhine is the neighbourhood of Isny, in the extreme S.E. of Württemberg, and within the Bavarian alpine system (Leydig).

A number of specimens were liberated, in 1876 (*cf.* Zeitschrift für Wiss. Zoologie), near Wildbad and Freiburg, in the Black Forest, but nothing more has been heard of them.

NOTES AND QUERIES.

MAMMALIA.

Badgers near Scarborough.—On April 15th a pair of Badgers were captured alive at Flixton, a small village on the Yorkshire Wolds, some six miles from Scarborough. On digging down to the nest a mass of moss and dry grass sufficient to fill a wheelbarrow was found, in which the Badgers were curled up asleep. Both were secured uninjured; but the male, a fine animal weighing 26 lbs., was afterwards killed, and has since been stuffed. The female has been kept alive, in the hopes of securing a litter of young ones. Whilst digging down to the nest a very perfect skull of the Badger was unearthed, which had evidently lain there a considerable time.—WILLIAM J. CLARKE (44, Huntriss Row, Scarborough).

Polecats at Scarborough one hundred years ago. — A friend of mine, while going through the Archives of Scarborough, a short time ago,

* Such, at least, is the result of statistics, so far as they have been published with respect to man, and my own observations agree in giving a considerable preponderance to males. This can be well seen among the manufacturing population of Lancashire, where the phenomenon is not rare, especially among children. The mortality here during growth is doubtless increased by bad nutrition, unhealthy surroundings, and overcrowding, which, besides favouring anæmia and other diseases, are not calculated to alleviate the ordinary evils associated with albinism: defective sight, photophobia, nystagmus, &c.

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J. E. HARTING, F.L.S., F.Z.S.,

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ON THE HERPETOLOGY OF THE GRAND DUCHY OF BADEN.

By G. Norman Douglass.

This part of Germany is now quite familiar to Englishmen, and it will suffice, for the purpose of these introductory remarks, briefly to glance over its physical features, to the influence of which its exceptional variety of organic life is in great measure due. The Black Forest, forming the back-bone of the country, comprises—within a limited area—considerable diversity of aspect; thus the Southern and Western Slopes, skirting the Rhine valley, are reckoned amongst the warmest parts of Germany, while, as we ascend its inclines, we find ourselves in districts of an almost Alpine character or on exposed table-lands, such as that constituting the watershed of the Danube and the rivers flowing westwards.

The surface of this region is similarly more diversified than its name might lead us to suppose, and the extensive fir forests, relieved here and there by rocky eminences or stretches of moorland and lakes, and intersected by numberless rivulets, are most productive in variety of specific forms. This circumstance strikes the observer more readily than their actual individual abundance, and can be explained by the fact that many strictly lowland forms, following up the sheltered valleys, are found in surroundings no longer adapted to their habits and occupied already by other, often allied or representative, species.

The more monotonous Rhine valley contrasts unfavourably in point of natural scenery with the mountainous tracts, though this portion of the country equally is not devoid of attractions for the naturalist, as it supports some highly interesting types of animal life. An almost continuous and luxuriant growth of wood, interspersed by small sheets of water in connection with the Rhine, covers the humid soil on both banks of that river, and it is much to be regretted that both here, as elsewhere, the relentless advance of civilization, under various disguises, has perceptibly reduced the numbers of several species, and threatens eventually to exterminate entire orders.

Between the above-mentioned belt of vegetation and the Schwarzwald proper, its northern less elevated prolongations,

and a portion of the Odenwald in the extreme north, is situated the alluvial Rhine plain, containing the most populous and highly cultivated districts.

As regards the geological constitution of the Grand Duchy, which has attracted the attention of several eminent writers, little need here be said, as its effects, direct or indirect, upon the organisms distributed over the surface, are easily over-rated, and indeed, in the case of the higher animals, almost *nil*. It will therefore be sufficient to notice that the more hilly portions of the country are composed chiefly of gneiss and granite, with occasional porphyritic formations superimposed, and that among sedimentary rocks the Trias predominates, being represented by large beds of Bunter sandstone (identical with that of the Vosges) and Muschelkalk; while of particular interest, as affecting also in some degree the distribution of certain species, may be mentioned:—the re-appearance of the oolite as a continuation of the Swiss Jura, pierced by the Danube in its upper course; the occurrence of pleistocene Loess or fluviatile loam, in portions of the Rhine valley; some noteworthy tertiary deposits in the South-east; and, lastly, the elevations of phonolite, dolerite, and other volcanic material of the Höhgau (north of Schaffhausen), the Kaiserstuhl (between Freiburg and the Rhine), and one or two isolated points.

Such contrasts of temperature and marked diversity of surface and soil may justly be expected to favour the preservation of the rarer indigenous species, while the geographical position of the country has afforded the necessary facilities for the immigration, from various points and by various sources, of foreign ones; and it is to the influence of these factors that we may attribute the richness, in almost all its branches, of the native organic world.

Referring exclusively to reptiles and amphibians, we find that Baden lays claim to nearly all the German species of the former now recognised, one Chelonian and one Ophidian only being absent from the list. Whereas in this instance we have reason to apprehend that the number may never be augmented, there is some prospect that of the two anurous batrachians, with the presence of which this country is as yet not credited, one or the other may still be discovered. Of tailed batrachians only one sub-alpine form can be cited, to which it is not entitled.

Yet, notwithstanding these apparent inducements, the number of those who have published observations on this branch of Natural History is relatively insignificant, even when compared with that of their collaborators of the neighbouring provinces; so much so, that the author who first, in 1883, sketched a brief outline of the entire native Fauna, is able to enumerate only two previous papers as dealing with these classes. In the two pages devoted to Herpetology of the treatise above referred to, an accurate, though not very detailed, account of the habitat of each species, so far as was then possible, is given; but since that time the study of this science has progressed with rapid strides, and, as is usually the case, some of the most valuable contributions to a general knowledge are found scattered throughout various works.

The following notes—founded mostly on observations which terminated with the earlier half of 1889—may perhaps induce others visiting this part of Germany to take up the same subject, and I may here premise that much still remains to be cleared up, as there is an astounding dearth of information respecting, for instance, the range of some of the more nocturnal and restricted batrachia, whose economy can be investigated successfully only at certain seasons of the year, as well as of those species which have only of late been added to the Fauna of Europe.

I have refrained from entering into descriptions of typical forms such as will be found in all systematic works, but have ventured to discuss more fully some of the phenomena of coloration, in the hope that this enquiry may merit the notice of other observers who have hitherto confined their remarks to the more descriptive side of the subject.

Reptilia.—Order I. Chelonia.

1. *Emys lutaria*, Mars.—Any specimens obtained in the Grand Duchy within recent times have doubtless not been of wild origin, and it may be added that equally little importance can be attached to the accounts of its occurrence in other parts of South Germany, such as in the neighbourhood of Kreuznach and various parts in Bavaria, &c.,—reports which have generally been founded on the capture of single individuals, escaped or purposely liberated. In Switzerland, also, its occurrence in a wild condition seems very doubtful, though F. v. Tschudi notes the capture of several in the valley of the Reuss, "which did

not appear to be specimens that had escaped" : others, from the Rhone valley, Lake of Geneva, and elsewhere, are now considered to have been introduced (Fatio). Not so in Northern Germany, where this species is found in Mecklenburg, Brandenburg, Posen, Eastern Prussia; further, in Courland,—though not in Livonia,* —and even as far as the vicinities of Moscow.

Hence we may suppose that its hardy constitution would have been proof against all the climatal vicissitudes of the regions (Upper and Lower Austria, South Germany, North and Central France) situated between the above-mentioned northern limits and the Mediterranean countries, Dalmatia, Italy, South France, to which it is again indigenous. Fossiliferous remains testify to its former more extended and connected range; and its present apparent extirpation in the intervening territorial zone referred to may be attributed in some degree to an extreme structural inflexibility.

Order II. Sauria.—I. Fam. Lacertidæ.

1. *Lacerta viridis*, Laur.—The range of this lizard is restricted in Baden to apparently two points, one of which, the Isteiner Klotz,—a hill lying between Freiburg and Bâle, and near the Rhine,—is frequently referred to. It appears to be rarer there now than formerly.† The other locality is the Kaiserstuhl already mentioned, where it is found in considerable numbers, affecting chiefly the central portions and the warm slope towards the Rhine (in greatest abundance on the so-called "Badberg," and near the ruined castle of Limburg), whilst, so far as my experience goes, it avoids the southern and eastern districts, where its place is iccupied by a particularly fine race of *L. agilis*.

Specimens from here often attain 30 to 35 centimètres in length, and are usually of the *punctata*, Daud., variety, the female retaining more of the green ground-colour. The young of both sexes, at first characterized by a uniform brownish tint, generally assume with advancing years a tendency to *maculata*, Dugès,—Fatio's var. "tachée ou marbrée,—which develops later into the *punctata* of the adults, this process being carried furthest in the male. Sometimes this tendency fails to assert itself, in which case the

* See O. v. Lewis, 'Reptilien Kur-Liv-und Esthlands.' 1884.

† F. Müller, 'Verhandlungen der Naturforsch. Gesellschaft zu Basel.'

adults are of the bright green colour,—var. *concolor*, Dugès,—common, it appears, with German specimens from other localities, though I have found this form scarce on the Kaiserstuhl. Both the young and adult females often exhibit traces of the *bilineata*, Daud.

The immigration of this species into the country has evidently taken place by way of the Jura and Bâle, and its present sporadic distribution throughout South Germany can be ascribed to its well-known sensibility to cold and damp, and has not resulted from a supposed predilection for any particular soil. The Kaiserstuhl is covered to a large extent with the alluvial Loess, and I have been informed of the occurrence of *L. viridis* on tracts of this and loamy ground in other districts; but it appears highly probable that the Sand Lizard, which thrives exceptionally well on this soil, has been the cause of these statements. Prof. Leydig observed that *L. agilis* preferred the Keuper to the Muschelkalk, and in the Northern Palatinate the Wall Lizard is often conspicuous by its absence on metamorphic rocks, while abundant everywhere on the red sandstone; still, in spite of this and other negative evidence, I should hesitate in imputing any importance to this factor in the case of *L. viridis*.

Its distribution in other parts of Germany is now pretty accurately determined. It is found chiefly along the Rhine (at Bingen, Rüdesheim, St. Goar, Loreley, &c.), and its western tributaries, the Nahe and Moselle; as also on the Danube near the point where it enters Austria. In the Haardt mountains of the Bavarian Palatinate, where an excellent authority (Dr. Noll) reports its occurrence, I have failed to detect any traces, nor have I been more successful in the course of my excursions into other parts of that country, and must certainly agree with Medicus* as to its extreme rarity there. Through the kindness of Mr. Basserman, of Deidesheim, I received a fine male *punctata* from that locality, which settles the question formerly raised as to its occurrence at this—again apparently isolated—point. He informs me that it is found in some numbers at two places near the town,—the "Königsbacher Wald" and the "Waldberg."

Several writers testify to the existence of this species near

* 'Thiere der Rheinpfalz,' 1867.

Worms; hence I must consider my not meeting with it there as accidental: at Oberstein, on the river Nahe, celebrated for its agate industry, it was likewise not to be seen. This latter fact may help to support Mr. Geisen-Heyner's * supposition that it does not ascend the river beyond Münster.

The *L. viridis* of the Kaiserstuhl, though frequently of a bluish tinge about the head and neck, is not of the true "*mento-cærulea*" (Bonap.) variety, as it is found in parts of the Tyrol, Italy, &c. With typical individuals of this variety the lateral and anterior portions of the head, as well as the lower jaw, are often of a vivid green colour, whereas with specimens from the Kaiserstuhl it is precisely these parts which display the most intense blue, the throat itself being seldom thus marked. It may therefore be assumed that the latter are tending to attain this feature characteristic of the true *mento-cærulea*, though as yet they have not arrived at its typical development; and I should regard the green colour above referred to as the latest modification in this line of ornamentation, thus, that the blue has gradually concentrated itself on the throat, and that the head, by way of additional contrast, has re-assumed the original green colour.

Similar instances, illustrating a sort of reciprocal convertibility of the colours blue and green, when employed for mere "decorative" purposes, are exhibited by some forms of *L. muralis* —compare var. *cæruleo-ocellata: viridi-ocellata*—and other reptiles; sometimes the blue seems to have the priority, acquiring only by degrees an iridescent greenish lustre, which in its turn may become so permanent as to efface the original blue; in other cases the latter colour appears of more recent origin. It is noticeable that the same colours alternate in an analogous manner with some birds.

Even comparatively young individuals from the Kaiserstuhl are thus marked, a circumstance which no doubt favours the transmission of this character from the male to the female. There seems to be no difficulty in assuming such a transmission to have taken place, in view of the fact that many secondary sexual characters peculiar to the one are often inherited by both sexes, and more readily if they occur at an early age; and in the instance of colour, which is most easily modified and transmitted, many ornaments confined to the male

* 'Wirbeltierfauna von Kreuznach,' 1888.

tend to reappear in the female, sometimes with the curious phenomenon of a greater or less change in tint, consequent doubtless on physiological causes. The *mento-cærulea* variety is certainly a local fashion, so to speak, and it deserves notice that the distinguishing blue patch on the throat is in many localities of the most ephemeral nature; in others it is retained long after the honeymoon, and in some again the lizards are perpetually thus coloured.* Finally, this feature is not rarely confined to the male, but elsewhere equally conspicuous in both sexes (see de Bedriaga, 'Beitrage zur Kenntnis der Lacertidenfamilie,' p. 67).

Hence the unstable character of these periodical variations in colour does not preclude the possibility of their becoming fixed under certain conditions, and it may conversely be urged that many now permanent tints may have been at a former period more or less short lived.

In this category can be placed the blue of the Faraglione Lizard and other analogous varieties, to which I hope to recur later, merely noting here that the throat of the male is again the most brilliantly coloured portion of the body, that of the female being much less vivid; but in neither case does the blue appearance of the lizards entirely vanish during the summer and autumn, whereas the blue tinge occasionally suffused over the body of the common Wall Lizard is most volatile.

L. vivipara and *agilis* offer similar examples of blue colouring, during the pairing season, on the throat and lower surfaces, some Russian forms of the latter having, according to Bedriaga, a mark on the throat analogous to that of *L. viridis mento-cærulea*.

As the intensity of brilliant colours is generally considered to diminish if light be excluded, the behaviour of some specimens of *L. agilis*, which I had occasion to forward a day's journey to Prof. Leydig, may be worthy of notice to illustrate that the reverse sometimes takes place. He writes:—"On opening the box several of the males were of a light green, almost phosphor-

* In parts of Southern Italy I was surprised to find that *L. viridis* exhibited, even in the height of spring, no signs of blue colouring about the head; whilst with others captured near Lake Como the blue was hardly diminished in intensity even in autumn. (The Dalmatian *viridis*—var. *major*, Boul.—is entirely devoid of this peculiarity.)

escent, colouring all over (including the head and extremities), which soon, however, disappeared on their being set in a terrarium, and gave place to the usual green colour." He connects this with a similar change in the colour of *L. viridis* recorded by Vallisnieri, and referred to in Prof. Leydig's work on the German Saurians, p. 166. Other instances of a like nature —due in all cases to the action of the chromatophores—have been observed with the Batrachia, and with the m all variations of colour, whether seasonal or otherwise, are more rapidly produced and effaced.*

The term local, as applied to many forms of this species, is a little misleading, only a few being characteristic of distinct localities, though they certainly do not all occur promiscuously. Passing the whole series of varieties in review, we find that the main types change as we proceed from west to east; in the former the ocellated, in the latter the longitudinally striated varieties are more prevalent.

On the Kaiserstuhl, *L. viridis* was pairing about the middle of April or later, the males in slight numerical preponderance, and I have found the eggs as early as the latter part of June, once or twice under stones, a fact which perhaps indicates (as others have already observed) that the female had carried them there for safety.

The "voice" of *L. viridis* consists in a hissing or rasping sound, which appears to be by no means common to all individuals, and I noticed that the few of this species and of *L. agilis* which possessed this peculiarity were males. The power of emitting sounds appears more general with the *viridis* of Trieste (Prof. Landois, cited by Eimer): according to the last-named naturalist, *L. muralis cærulea* is equally capable of producing them.

In the instances which have come under my notice an examination failed to reveal any catarrhal symptoms, such as those which seem to affect some individuals of *L. muralis* when subject to sudden changes of climate. A pathological condition similar to this last is described by J. J. Tschudi in the case of *L. agilis*, but with this notable difference, that here the lizards were found in this state, and infected two others with which they were afterwards confined.

* Leydig, 'Uber das Blau,' &c., 1889.

The following dates, all of which may be depended upon *quantum valeant*, of course prove nothing beyond the dates upon which my informants first saw the birds named. In my opinion, the *only* value of these records is for comparison with others from different localities:—March 12th, Woodcock; 16th, Merlin; 23rd, Chiffchaff; 28th, Wheatear; 30th, Whinchat, Tree Pipit; 31st, Wryneck, Golden Plover. April 9th, Blackcap; 14th, Ray's Wagtail, Swallow; 15th, Martin; 16th, Cuckoo, Willow Wren; 17th, Sand Martin; 18th, Wigeon; 21st, Redstart, Nightingale; 22nd, Sedge Warbler; 23rd, Common Sandpiper; 26th, Whitethroat; 29th, Wood Wren, Red-backed Shrike; 30th, Landrail. May 2nd, Turtle Dove; 4th, Lesser Whitethroat; 6th, Spotted Flycatcher; 7th, Reed Warbler; 15th, Swift.

ON THE HERPETOLOGY OF THE GRAND DUCHY OF BADEN.

By G. Norman Douglass.

(Continued from p. 20.)

2. *Lacerta agilis* (Linn.).—The young are the first to appear in spring, namely, about the middle of March, and often pay dearly for their temerity; they are also the last to withdraw towards the end of October. The old males leave their winter quarters towards the beginning of April, and may be observed, often still covered with earth, basking in the warm sunshine. They precede the females by about a week, as in the case of many other reptiles, batrachia, fishes, and migratory birds.

With respect to the distribution of this lizard, it may be noticed that in the Bavarian Palatinate and Northern Elsass it is for the most part less ubiquitous than *L. muralis;* and I hear that in some districts, as near Deidesheim, where both the southern forms are found, *L. agilis* is decidedly scarce. On the eastern side of the Rhine it is by far the most generally-diffused species, avoiding the highest parts only of the Black Forest, while in the lower and wooded portions of the country it is most abundant, and frequently attains large dimensions.

The extreme length usually cited is 21 cm., but, in the immediate vicinity of the capital, specimens of 20 to 22 cm. are not

uncommon, and one in my possession from a small village about five miles distant (Wörth) measures as much as 25·1 cm. This individual, a male, is otherwise interesting as possessing a distinctly-developed gular fold, a feature as a rule not marked in *L. agilis*. According to Bedriaga, the gular fold is characteristic of some Russian forms of this species, a circumstance which appears to countenance his supposition respecting its affinity with *L. viridis*, these Russian varieties being, as he shows, the intermediate links. I see Steindachner ('Schlangen &c. der Galapagosinseln'), speaking of *Amblyrhynchus*, says, "Some large specimens have a *sulcus gularis*, others have absolutely none." The young of *L. agilis* possess a marked gular fold, which, in the same manner as that of some caudate batrachians, loses its distinctness at the approach of maturity.

During the growth of the individual the collar which at first, like that of *L. muralis*, is even-edged, becomes denticulated. It is to be observed, however, that immediately after desquamation, or with males of a bright green colour, the edges of the otherwise pigmented collar are often quite translucent, the green colour exhibiting an even line, as though the collar were not serrated.

It is open to question whether much stress should be laid on cases of individual variability such as these, though they may under circumstances give a clue to generic relationships. As another example may be adduced the variability in the rows of ventral plates of certain species, which has caused some difficulty to systematic naturalists; as also the irregularities occurring in the plates on the head. From a considerable list of such irregularities which I have tabulated,* it appears that (1) they occur more frequently with the male than with the female; (2) some correlation appears to exist between certain plates, the variability of one entailing that of another; (3) some irregularities are more liable to occur than others, and in an analogous manner with different species of lizards.

This tendency in different species to present analogous vari-

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* As: occipital rudimentary, often absent; internasal very variable in shape and size; between the latter and the frontonasalia a small plate often inserted; interparietal divided into small plates; two plates joined together without a division, or all plates irregular (perhaps the result of an external injury), &c.

ations is in itself a study, and one which deserves in the highest degree the attention of those who have the required leisure and materials at their disposal. In view of the growing interest now justly attached to "variability" in general, it may not be out of place to refer to a few facts of this nature which have struck me in comparing a very limited number of species, and with respect only to one character (that of colour). Generalisation is not always to be commended in enquiries of this description, but in the present instance it will appear obvious that the universality of the phenomenon becomes more apparent as we extend the field for investigation of this subject, by bringing together larger groups, and by comparing them from more than one point of view. Perhaps in no department more than in Herpetology has this tendency to analogous variability been productive of confusion in nomenclature, by frequently concealing true "specific" characters.

In the instance of *Lacerta agilis* hardly any colour-variety can be pointed out which is not "parallel" to others of *L. viridis* or *L. muralis*. Thus the uniform brilliant green tint, which covers in rare cases even the head, limbs, and dorsal zone of the male,* —the last parts of the body to undergo this periodical change,— may be said to correspond in *L. muralis* to the var. *elegans*, Eimer, or to the var. *viridissima*, Fitz. of *L. viridis*. Another variety of the same lizard, not uncommon in Baden, is marked by a profusion of small black dots, greatly resembling the ordinary *L. viridis punctata*, and suggestive of several types of *L. muralis*.

In considering the curious tendency exhibited by various species to offer analogous varieties of this description, it is immaterial to notice whether these varieties are found only sporadically, or whether they have developed into fixed local races; and further, whether the analogy is permanent or of a merely transitory nature. For it is sometimes more pronounced at certain periods of the year, and in some cases it is only then that its existence strikes the observer.

In support of this, I may call attention to the significant fact that some males of *L. agilis*, far from obliterating in spring all

* Boettger, 'Zoolog. Garten,' 1885, mentions this form of *L. agilis* as very common near Strasburg.

traces of their usual darker markings in a glow of vivid green (as has been supposed), frequently tend to embellish and render conspicuous these designs, notably the brown dorsal stripe.* This is often transformed into an object of great beauty, and a considerable amount of variety is displayed even in the arrangement of this single feature. In many cases a broad band of white runs down the middle of it, in others two thin white bands accompany it on each side, the vertebral zone itself being narrowed and darkened at the same time. Sometimes to the last figure a delicate row of white specks is also added along the centre of the back, which then displays three parallel white lines; or again, the ocelli on the lateral portions each exhibit a white centre. An exactly similar development of patterns takes place with some forms of *L. muralis*, while the analogy with *L. viridis bilineata* (or respectively *trilineata* and *quinque-vittata*) is evident.†

The Sand Lizard offers other varieties interesting from this point of view, such as one which may be called analogous to the var. *nigriventris* of *Lacerta muralis*—a *nigriventris* form of *L. oxycephala* has also been described—another is transversely barred with black markings, like several forms of *L. viridis* and *L. muralis*.

Even the Blind-worm, *Anguis fragilis*, within its stringently limited province of variation, furnishes varieties analogous to the single- or double-lined, as well as to the speckled or cross-striped forms of *L. agilis* above referred to, and if we look still further to the Colubrine Snakes, we encounter numberless instances of one species presenting simultaneously uniformly-coloured, spotted, longitudinally or transversely striated varieties.

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* The difference between two males thus diversely decorated is very striking:—later in the season they again resemble each other (having doffed their ornamental costume), and generally assume a bluish-grey tint, owing, I presume, to the "diminished vigour of the constitution."

† It is difficult to imagine why certain colour-varieties of one species should occur often promiscuously amongst others, and elsewhere as fixed local forms. In the latter case they are sometimes seen to gain the advantages of adaptation to the environment at the same time. The particular two-lined variety of *L. viridis* above alluded to has probably not become established in more parts of Western Europe because it is here mostly confined to the female, and in such cases of sexual dimorphism the preponderance of the male element will generally prevent the young from acquiring, otherwise than temporarily, characters peculiar to the female.

Of still more general nature may be mentioned the frequent appearance, in very many reptiles, of melanotic varieties. Another example is the widespread tendency for morphologically corresponding parts to be marked in a similar manner. Thus attention has been drawn (Leydig, 'Pigmente der Haut-decke,' p. 17) to the dark streak which in many amphibia runs from the nasal opening through the eyes, and is likewise perceivable in some ophidians.* Another case in point is the bright yellow colouring which is seen on the hind legs of many of our *Ranidæ* (its entire absence with *R. ridibunda* is a distinguishing feature of that species); the reproduction of blue or black spots on the outer ventral plates, common to all four of the German *Lacertidæ*, or the V-shaped mark on the shoulders of many anurous batrachians may be also mentioned. The formation of the last-named feature can be traced, in all species which possess it, to the breaking-up of the lateral lines into oval spots, which, when they coalesce at the back of the head (though this is not universally the case), produce this figure.

But, though the development of these markings may have been identical, their existence is less a sign of close affinity than of an inherited tendency to vary in an analogous manner; a fact which is demonstrated still more clearly in the rarer cases of structural variability of this kind.

A reference to any work which enumerates the varieties of the Reptilia and Amphibia will show that the number of such instances could be multiplied *ad infinitum*, and will serve at the same time to illustrate the principle firmly established, that "Nature is prodigal in variety, but niggardly in innovation."

A number of Sand Lizards from extensive tracts of wood in Baden, and from the large Bienwald on the other side of the Rhine, were very uniform in their coloration. This circumstance at first led me to suspect a connection between the locality

* The importance attached by some zoologists to markings, even as characteristic as these often are, as something inoculated into the constitution, and hence unalterable, appears often exaggerated. With birds they are frequently of great value; with reptiles, and still more in the case of batrachians, their stability is easily overrated, and in the cases here named the markings, or special colours, however frequent, are not constant characters in the species which exhibit them.

and their colour, but I should feel averse to drawing any inference from this case, unless it could be supported by others.

A propos of some protectively coloured local races of this species referred to by Dr. Leydig, I have been at some pains to discover the exact locality in his instance of those on the Gebhardsberg, near Lake Constance; but hitherto without success. During a visit to the renowned Miocene deposits at Oehningen, on the Rhine, I was no less unfortunate with the protectively-coloured *L. agilis* he mentions; but this was to be expected, as the sides of the road on which the adaptation to the soil was observed' were quite overgrown at the time. I may note that these quarries, celebrated in their day for Schleuchzer's "*homo diluvii testis*," and the wonderful Fauna and Flora described by Heer and others, have been entirely covered with vegetation for the last twelve years, so that this site is now-a-days only found with difficulty. It was last worked by an enterprising Swiss, who established some brick-kilns there, but at present the enthusiastic palæontologist, if not sufficiently compensated for this disappointment by the scenery, is driven to excavate his own quarry in order to obtain a few specimens.

The individual variability of this species is great. In a series of males from the Kaiserstuhl the dorsal stripe was of a light brick-red colour: this, however, proved to be not the true var. *erythronotus* Fitz., prevalent in several chiefly mountainous districts.

Passing on to isolated cases, one or two males captured at different seasons and localities, were interesting, the upper surfaces and sides being of a dark gamboge colour, without any traces of green. With the female the sphere of variability is more restricted; one type of coloration not uncommonly met with is greyish green, covered with innumerable black and white dots, and recalling the speckled male variety already alluded to. Another form is of a uniform cinnamon-colour, others again are very prettily marked with rings of reddish brown on a ground of stone-colour. The lower surfaces sometimes assume a rich yellow tinge, and it is noticeable that the female of *L. viridis* is often coloured in a similar manner.

L. agilis, as well as the three other species, suffers much from the parasitic *Ixodes ricinus*. I have counted as many as

forty-five of these pests on one individual, affecting mostly the throat, limbs, and face.

The proportion of the sexes seems to be more equal than with *L. muralis*. The males still predominate considerably, although the females, especially towards summer, appear to be more numerous, owing to their diminished activity.

(To be continued.)

NOTES AND QUERIES.

Death of the Rev. H. T. Frere.—We have recently heard with regret of the death of an old contributor to this journal, in the person of the Rev. Henry Temple Frere, who passed away in December last, in the sixty-ninth year of his age, at Burston Rectory, near Diss. He was born at the family seat at Roydon Hall, in 1821, and was all his life devoted to the study of Natural History. The owner of a small but choice collection of birds, he prided himself especially on two British-killed Savi's Warblers, one of which he lately presented to Professor Newton for the Cambridge Museum, and an American Meadow Starling, *Sturnella magna*, shot at Thrandeston, in March, 1860. He was one of the oldest correspondents of 'The Zoologist,' and a member of the Norwich Naturalists' Society, whom he entertained at Burston on the occasion of one of their annual excursions. In the Natural History of his own county he always took a great interest, and was a constant correspondent of the late Mr. Stevenson, to whom he communicated several useful notes for his 'Birds of Norfolk.'

MAMMALIA.

Melanism in Mammals and the Irish Rat.—In Dr. Mivart's 'Monograph of the Canidæ,' in his description (p. 7) of the black variety of the Wolf, he remarks:—"It is not, however, completely black, having a reddish tinge on the hinder part of either thigh, while the margins of the mouth, a patch on the breast, the under surface of the lower jaw, and the paws are white." Now in the black variety of the Common Rat (the so-called Irish Rat, *Mus hibernicus* of Thompson), the region of the muzzle is whitish, the feet are silvery white, and in about twenty per cent. of the specimens examined by us the breast had a white patch. The flanks of the Irish Rat have a reddish cast, and in not a few specimens this is more pronounced upon the thighs. We have no wish to give undue significance to the value of these peculiarities, but we venture to suggest the probability that the phenomenon of melanism in the Mammalia is frequently accompanied by

Ducks, and sixteen Pochards, a sharp frost soon filling the stalls. Hundreds of Dunlin were shot, and other birds suffered in equal proportion. Mr. Monement reports that at Morston a number of Mallard came to feed where a stack had been thrashed. He also observed a herd of eleven Swans, and about the same time three Swans, perhaps out of the same flock, were shot. Many Kingfishers, Green Woodpeckers, and Barn Owls—the last named fat, the others very poor—were brought to our birdstuffers. On the 20th also, Mr. Patterson saw seven Wood Larks at Yarmouth, which a market gardener had just shot in the snow.

Mr. G. Smith wrote from Yarmouth, Dec. 28th, that, owing to the prolonged frost, the poor Black-headed Gulls were ready to do anything to get food, and that a great many had been caught in nets; one bird-catcher took fifty-six in one pull with a clap-net, and altogether about 150 starved Gulls were brought to Mr. Smith. Many of the ravenous birds were fed by the charitable, and no one remembered to have seen them so daring in approaching houses.

ON THE HERPETOLOGY OF THE GRAND DUCHY OF BADEN.

By G. Norman Douglass.

(Continued from p. 59.)

3. *Lacerta vivipara*, Jacq.—Of this lizard comparatively few Baden specimens have passed through my hands, and they differed little in their coloration from others found on the Scotch moors or in England. Though exhibiting a good deal of slight individual variability, the only distinct variety in this part of Germany which has attracted notice is the light-coloured *L. montana*, Mikan, reported as occurring at Rippoldsau, in the Schwarzwald. I made an excursion for the purpose of obtaining adult specimens of this form, but the weather proved unfavourable, and the few young I succeeded in capturing resembled the typical form.

The viviparous lizard appears generally distributed throughout the Black Forest region (*i. e.*, as far north as the River Alb, which flows within a mile of Karlsruhe), continuing its range, after a considerable break, in the Odenwald. It is found plentifully all round Baden-Baden (Teufelsmühle, Herrenwies, Hornis-

grinde, Wildsee), as well as further south, in the neighbourhood of Freiburg (Feldberg, &c.); further eastwards its range extends, I believe, as far as Donaueschingen. On the Kaiserstuhl, and in all districts where the vine is cultivated, this species is replaced by *L. agilis*, which shows less antipathy for human proximity, and it may be worth noticing that in Baden it does not seem to frequent moist low-lying districts as in other parts of Germany and elsewhere. In the hilly country of the Southern Palatinate this species is also found, at least if I may rely on the statement of an exceptionally intelligent peasant, who surprised me by describing accurately all the native reptiles, and, most of all, by designating *L. muralis* as the "Italian" lizard.

In point of size this species is smaller than *L. agilis*, and of more delicate build. The extreme length may be put down to 17 cm., very few, even full-grown specimens, attaining more than 16 cm.

Being found at altitudes where snow lies for six months in the year, this lizard must necessarily be of very hardy constitution, and in the Schwarzwald it may be seen up to the end of October on ground already covered with hoar frost. It often emerges as early as March. The dark coloration sometimes exhibited by this species has led to some speculation as to its probable cause, and a good deal of evidence has been adduced to show that both here and with *Anguis fragilis* this "melanism" has resulted from moisture of the surroundings. But the effects of this are easily over-estimated in dealing with the number of similar cases for which no explanation has hitherto been attempted. Referring to *L. nigra*, Wolf, it has also been suggested that its dark colour is in some manner connected with the "high altitudes" at which this lizard is often found, while it remains obscure what "moisture" and "altitudes" should have in common in order to be able to influence the colour of this and other species in an analogous manner.* In the Alps

* Unless I am mistaken, two distinct melanistic varieties of the Rattlesnake have been discovered in N. America; one, *Crotalophorus Kirtlandi*, inhabiting swampy districts, the other confined to portions of the White Mountains. Some cases might be quoted to show that a sudden change to moisture has been temporarily followed by a general darkening of the ground-colour; on the other hand, a peculiarly light coloration has been attributed to the same cause.

the phenomenon of black or sombre tints is so common with widely-separated classes of animals that we are driven to assume some general cause producing it. And, by way of hypothesis, to explain some of these facts, Prof. Eimer has suggested the direct effects of the "former dampness"* in the atmosphere, and is evidently disposed to see in the present colour of the embryo of *L. vivipara* (which has been "retained" by the melanic adults) that of its ancestors in the post-glacial period. But in the case of several higher alpine animals which equally tend to "melanism," this can hardly be admitted a *vera causa*, and it is almost as easy to imagine—while we are *in nubibus*—that in this instance the glacial epoch itself favoured, indirectly, the production of black, by preserving those individuals who could best retain warmth through means of dark-coloured fur. At the cessation of extreme cold the majority would re-assume more protective coloration, while those remaining in the Alps and other secluded localities would continue less liable to lose this tendency. Perhaps in this period can be placed the acquisition of viviparous habits by *Pelias berus*, as well as the origin of the singular development of *Salamandra atra* and other peculiarities of alpine forms. With *L. vivipara*, as well as *Anguis fragilis* and *Pelias berus*, the females incline more to variability of this description, and in the first-named it is therefore easy to assume a tendency to revert to ancestral coloration, though this hardly explains the matter satisfactorily. And, speaking of reptiles in general, we are unable in the vast majority of cases to account for the frequent appearance of "melanism." We see that there are many grades of this condition, from a scarcely appreciable difference in the normal coloration to complete blackness, and that all these gradations are frequently displayed by one species; and further, that while most species exhibit some individual variability of this character, the tendency has in others led to the production of melanotic varieties, possessing often a local preponderance over the typical form. It also becomes evident that this form of coloration spreads over the body in different ways, and is induced or favoured by various, not always external, causes, for the investigation of which the microscope alone is of little value.

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* 'Variieren der Mauereidechse,' p. 200.

Perhaps the most intelligible of dark-coloured varieties are those formed through adaptation to the environment (such as many varieties of the Wall-lizard on the islands and continent of Italy), for there is no difficulty in understanding how on black volcanic ground, for instance, a dark race should have been gradually preserved through the action of natural selection. But in other melanic island forms of the same lizard (such as *L. Lilfordi*) the colour is no more protective than in the many analogous forms of other reptiles which are repeatedly being discovered, but is due to an entirely different cause. Unfortunately, all anatomical investigation has yet obtained but negative results, but I venture to think undue importance has in some of these cases again been attached to "moisture," whose effects must necessarily be either more universal or *nil*. In some more isolated instances of "melanism" among European *Lacertidæ*, the dark colour may possibly have been produced by change of food, or some other physiological derangement, but it appears to have spread over the body by the same method as in the cases above alluded to, that is, by the gradual darkening of the ground-tint, and not through the broadening out and fusion of the original markings.*

The var. *nigriventris* of *L. muralis* may be cited as an example of partial melanism, for here, as the name indicates, the dark colour is confined to the lower parts. In tracing out its course of development, we see that the black is first visible in the shape of minute spots on the throat, each scale of the collar being often prettily marked with a black centre-piece. In Germany it is frequently found in this stage of development, and sometimes also in the next (transitional) stage, which consists in the entire under surfaces being thus covered with minute spots, which afterwards, in the true *nigriventris*, Bonap., expand to the exclusion of all other colouring. It is noticeable that, in localities where this variety has become dominant, the first gradation of colour-development has been abbreviated, and the young already

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* Thus Gachet's black *L. viridis* is not an "advanced" *maculata*, if we may judge by what he says:—"Apres avoir été plongé pendant plusieurs jours dans l'alcool, ... les grosses taches noires, dont on ne voyait que des traces, sont devenues très-apparentes" (Act. d. l. Soc. Linn. de Bordeaux, 1833, p. 168).

display the intermediate stage, the adults passing on to the extreme *nigriventris*.

The facts of the distribution of this form—it occurs in patches, as it were, on the mainland and islands of Italy, sometimes exclusively, sometimes promiscuously—prove that we cannot turn to the all-explaining "external influences" for the cause of this coloration. As the initial tendency is on the part of the male, and an identical development of colour has taken place with the var. *rubriventris*, where again the throat is the first part of the body to be "ornamented," there is reason to believe that the black here, unornamental as it appears, may be due to sexual selection. To this subject I hope later to refer at more length, and will here merely remark that I am using the term strictly in the sense attached to it by Wallace, as it appears improbable that in different localities the same variety of one species should have been formed through the action of female choice.

With *Anguis fragilis*, dark-coloured individuals are occasionally met with, and here, in as many cases as have come under my notice,* the black pigment is concentrated on the under surfaces, diminishing towards the throat and tail (only in one instance the tail-end, above and below, was coloured black). The incipient "melanism" proceeds thence up the lateral portions, each scale in its turn receiving a small black central spot, till it reaches the darker zones which usually border the upper parts. Its progress may therefore be quoted as an exemplification of the "infero-superior" development, mentioned by Prof. Eimer in another work. Another process of colour-development, the "postero-anterior," is illustrated in the case of the melanic Ringed Snake, *Tropidonotus natrix*, var. *minax*, Bonap., where the black colour advances equally along both surfaces, "supra et subtus ater, concolor," as it is described. In the "*carbonarius*" variety of *Zamenis viridiflavus*, it is developed on the upper parts only: "supra ater, concolor, subtus griseus. . . . ." In the last-mentioned cases the dark colour does not, as with *L. Lilfordi*, diminish its intensity under the influence of alcohol, a fact which may be of importance as

* For with many reptiles two or more distinct melanotic varieties have been described.

bearing on its origin; nor can it be attributed to reversion, as in the case of *L. vivipara nigra*. It seems rather to be a recently-acquired coloration. With *Zamenis viridiflavus* the black, which may be regarded as an accentuation of the normal brownish tint, is attained by a series of imperceptible transitions, the speckled immature markings—*cf.* the ontogeny of the Blackbird—lingering longest about the head and neck. Viewed side by side, an adult "*carbonarius*" and a young individual of the same species offer an interesting study for the evolutionist. The tendency exhibited by many Colubrine Snakes to uniformity of coloration, which has led to the abolition of the brighter immature patterns and markings, has here and in some analogous instances proceeded, apparently, a step too far. It may be doubted whether the apparent advantages which a uniform tint would confer are now gained, and it remains a matter of speculation what the purpose of this innovation may consist in. In spite of some evidence of a similar nature,* I am disinclined to call to aid the cumulative effects of female preference, for it can hardly be supposed that a simultaneous and almost identical change of æsthetic tastes should be taking place in many of the females of several distinct species. And the fact that this form of coloration is most strongly pronounced in the oldest male seems sufficient to account for its successful *début*, since in all probability this new variety—whatever its original "cause" and present advantages—will, as such, possess greater vigour and fertility. The few well-known cases of melanism briefly referred to will serve to show that the causes producing this condition are in Herpetology no less obscure than in other departments of Zoology, and that, like albinism, it may still be called a dark chapter in Biology. It is less commonly accompanied by pathological symptoms than albinism in its various forms, whether innate or acquired. Indeed, the only case in Herpetology of melanism occurring (perhaps) as a disease which I have met with was a *Triton*

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* Poulton, 'Colours of Animals,' p. 303. It has also struck me that the "*carbonarius*" variety of this species is even more lively than the older form, but its extreme wariness may be due to the instinctive knowledge that the black colour renders it more conspicuous. And perhaps for this very reason it has not been more universally adopted by other snakes who equally incline to this coloration, but who are inferior to *Zamenis* in point of agility.

alpestris, captured near Dieppe, whose lower surfaces were discoloured by dark brown patches—akin, possibly, to the human melanism. And it may be doubted whether here the normal health of the individual was in any way affected.

AUTUMN NOTES FROM THE NORFOLK COAST, 1890.

By O. V. Aplin, M.B.O.U.

I was at Cley from the 1st to the 9th September, 1890, without seeing any remarkable migration of small birds, although this is usually the best time for meeting with the rarer migrants on that coast. My brother, Mr. F. C. Aplin, who was there a week earlier and a few days later, only noticed one decided case of immigration, *viz.* on August 29th, when there were a great many Willow Wrens and one or two Redstarts in the scrub. After I left I had news of a considerable "rush" of small birds, &c., about the 20th Sept., comprising Pied Flycatchers, Ring Ouzels, Garden Warblers, Willow Wrens, Chiffchaff, as well as Peregrines, Merlins, and some rarer species, of the occurrence of which I hope their fortunate captors will not keep ornithologists in ignorance. No Bluethroats, however, so far as I can learn, were observed this year, the explanation of which is probably that, in the absence of winds favourable to their striking the English shores, these birds passed straight on to their southern winter quarters. The unfavourable winds and fine summer-like weather of September probably also accounts for the comparatively small number of *early* autumn migratory land-birds which were observed here last season, and for the short time they stayed.

During the time that I was at Cley the wind and weather, although thoroughly enjoyable for boating and lying up to watch, or wait for, the birds, was most unpromising for bringing in any migrants or getting near the shore-birds which were already in the marsh. What waders we saw were accordingly wild, though high tides on the first few days helped us considerably.

The following diary of the weather speaks for itself:—1st, bright, still and hot. 2nd, S.W., moderate, overcast. 3rd, S.W.—W., moderate to very light; dull. 4th, S.W.—W., light; dull, wet until 2 or 3 p.m., then dull, hot and close. 5th, N.W.,

be overlooked, northern breeding birds arriving on the Holderness and North Lincolnshire coasts largely using this route during their land journeys. At certain times of the year the effect of this migration is very apparent in Nottinghamshire.

The most interesting feature connected with the Trent Valley route is the fact of its being used as a highway in spring, birds apparently arriving from the east and north-east. Amongst the birds using this route in spring are the Dunlin, Common Sandpiper, Redshank, Yellow Wagtail, and Sand Martin. I suggest that these species, or some of them, reach us *viâ* the Rhone and Rhine Valleys, and then across the North Sea to Lincolnshire, but beyond my own observation I have found little to confirm this theory.

ON THE HERPETOLOGY OF THE GRAND DUCHY OF BADEN.

By G. Norman Douglass.

(Continued from p. 144.)

4. *Lacerta muralis*, Laur.—An accurate account of the peculiar distribution of *L. muralis* in this part of South Germany was published thirty years ago.* As this account is quoted in most works on the subject, it will be unnecessary to give it here *in extenso*, but it suggests a fact worth noticing which has not, I think, been mentioned hitherto.

It has been assumed that the immigration of this species into this country has taken place *viâ* the gap between the Jura and Vosges ranges (a route by which many other southern forms have entered Germany), but, on comparing its actual distribution with a map, considerable difficulties present themselves. In the first place, the non-occurrence of *L. muralis* on the sunny slopes of the Rhine-valley proper, and in other warm parts of the country (on the Kaiserstuhl and the southern incline of the Schwarzwald, for instance), appears very singular. Instead of this, it is found high up in the Black Forest at several points over 700 mètres above sea-level, in cold and exposed situations. Further, it is curious that *L. muralis* should be absent in localities where other

* Dr. Paulus, 'Verein für Vaterländ. Naturkunde in Württemberg,' 1857.

species, which have followed the above-mentioned line of immigration, are found. There is also, thirdly, a considerable difference in size and colouring and, what is more important, in the method of distribution between the *L. muralis* of Baden and that of the Bavarian Palatinate, which could hardly be so marked, if both had penetrated into Germany from the same source.

It may therefore be asked whether this species has not, following the course of the Danube, descended further westwards from the central plateau of the Black Forest along the many small rivers on whose banks it now is found. Certainly this would pre-suppose its former existence in localities where it no longer occurs, and hence possibly a change of climate within a geologically recent period in these comparatively bleak regions. Still this hypothesis appears the less improbable as other species have unquestionably immigrated by this line, and also in view of the fact that *L. muralis*, like *L. viridis*, occurs on the Danube east of the Swabian and Bavarian table-lands.* If the immigration along the Danube therefore has not taken place at a very early period, we can sufficiently account for its present singularly restricted distribution by assuming a diminished ratio of increase in this less congenial climate. Besides, the "stationary distribution" characteristic of the *Lacertidæ*, will prevent any further emigration until the district occupied has become over-populated. And there are indications of such local over-population. Thus it may be observed that from Gerusbach in the Murg-valley (where this species is very abundant) it is spreading across the narrow watershed into the valley of the Oos, in which Baden-Baden lies; but the transmigration is as yet incomplete, for it appears to occur only on the Gerusbach side of the Oos valley.

As regards the distribution of this species in the Grand Duchy, my experience is confirmatory of the account above referred to. It is found on several of the old castles in the

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* This point need not have been reached exclusively from Lower Austria, but also from N. Italy. For *L. muralis* has been observed to cross the Brenner-pass, and may accordingly have come *viâ* the valley of the Inn (H. Krauss, 'Verhandl. Zool. Bot. Ges. Vienna,' 1873), whilst another author reports its occurrence in the higher course of the same river,—at Pfunds and Landeck,—which would imply an emigration from the south, parallel to that over the Brenner, by way of the Vintschgau. (I may mention that I never observed it at either of these localities.)

Black Forest, but only on such as are near the rivers mentioned by Dr. Paulus (*l. c.*). At Heidelberg I never observed it, and I see Bedriaga notes it has become rarer there of late years. Near the Katzenbuckel mountain, further up the Neckar, I could not detect it, nor yet at another point in the south of the country equally interesting to geologists, the Hohentwiel near Constance, where it is stated to occur.

In the Bavarian Palatinate *L. muralis* is considered the commonest lizard, being found both in the mountainous parts, and in the towns and vineyards of the Rhine valley. In the northern districts — near the Donnersberg, for instance — it seemed scarcer, while on all the romantic castles of the central and southern Palatinate—at Dahn, Trifels, Madenburg, Lindelbrunn, Drachenfels, Fleckenstein (of the Niebelungenlied), Weglenburg—it is extremely abundant. On the ramparts of the old fortress of Landau it may be seen in great numbers, and in the lanes throughout the whole country it is found promiscuously intermingled with *L. agilis*. In Elsass it is no doubt also universally distributed. I observed it on the fortifications of Weissenburg,* and along the fine road to Klimbach.

Specimens from Baden seldom exceed 17 centimetres in length. The males are generally speckled black on dark brown ground, and display a slight greenish iridescence in the light. The females incline more to the immature longitudinal striation; one or two specimens, indeed, exhibit four unbroken parallel lines along the back. The lower surfaces are usually of a pure white, or delicate pink colour, in very rare cases (in the male sex) assuming a more coppery tint. Throat sometimes, as with *L. agilis*, with black markings. Palatinate specimens are of greater size and colour-variability. Males with black-spotted throats become more numerous, and the under parts are frequently of a bright orange, which in the corresponding female form turns to a brick-dust colour. It may be observed that with German individuals of this variety the blue spots on the outer ventrals are, as a rule, inconspicuously small, and of greenish appearance, which suggests a sort of compensation on the part of

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* A female specimen from this locality was of a uniform black colour (above) when caught, but in alcohol the markings, revealing the usual characteristics of this race, came out more strongly.

Nature for the additional outlay of red colouring. The var *flaviventris* is found, I believe, in other parts of Germany (though I never observed it in Baden or the Palatinate): in other districts it has established itself to the exclusion of nearly all other forms.

It is in the extensive sub-species *filiquerta* that we meet with the best instances of the great colour-plasticity which has given this lizard the designation of "a cycle of varieties"; since we may reasonably expect a species to offer most variability where the conditions of life are most conformable to its constitution. The colouring is largely influenced by environment. This is natural, for being a prey to so many enemies, the capacity for assimilating its colour to the surroundings is of paramount importance, although its mental and physical abilities are of no mean order.

Hence we find many races of this species possessing protective coloration to so marked a degree as to have influenced the original markings whose development is considered to be dependent on purely internal or "constitutional" causes. A few instances will suffice. Eimer has shown that on some recent lava-fields near Mount Ætna a complete adaptation to the surroundings has taken place within the short space of 200 years, a circumstance which speaks highly for the capacities of this species, notwithstanding the facility with which colour, "that most fleeting of characters,"* is modified by Natural Selection. All around Vesuvius, and in similar localities, the lizards have assumed equally dark tints. Some specimens from near Ottajano, on Monte Somma, exhibited no traces of the usual markings. As a pendant to this, I was interested to notice, in 1888, an almost uniform greyish white variety of *L. muralis* on the light-coloured rocks near Arnalfi. In strong alcohol the markings both of the Vesuvian and Arnalfi lizards begin to appear, showing that they belong to the usual Neapolitan type. A pretty instance of this sort of local variety I also observed near Narbonne. Along a road outside the town, the adult *L. muralis* harmonised perfectly in colour with the yellowish soil, whereas the young were much more variable in colour, being often quite dark. There was certainly every reason for this precaution, to judge by the presence

* 'Origin of Species,' p. 28.

of several *Lamenis viridiflavus* and *Cœlopeltis lacertina* which frequented the same spot. Examples of such positively protective coloration will occur to everyone who has paid attention to this species in its native haunts, though it is not, as a rule, so pronounced as in the instances given. Thus, more recently, in the Lipari Islands I have come across races of this species on black lava, or white pumice partially covered with vegetation, in consequence of which the adaptation was not so complete, though still recognisable. It has also struck me that the very green colour of *L. muralis* in the fields of Lombardy may be thus accounted for.

The class comprising most varieties of *L. muralis* (from this point of view) contains those whose colour is not adapted to any special environment. It is protective only in a negative sense, inasmuch as a still brighter coloration would render the lizards too conspicuous.* Under this denomination may be included nearly all varieties of this species.

There is yet a third class containing some island forms of this species (*L. filfolensis*, &c.), whose colour cannot, I think, be called protective in any sense of the word. Owing to the absence of enemies, the equilibrium between competing species is in these localities no longer preserved, and, under such exceptionally favourable circumstances, these remarkable divergent forms have been developed. That they should resemble each other to a certain extent is not more than we should expect, considering their common origin, and the natural tendency to analogous variability under similar conditions, while it is noticeable that the main points of difference are such as exist between the secondary sexual characters. There are many islets in the Mediterranean on which the lizards are of necessity protectively coloured, being few in number, and, if possible, more shy than on the mainland, but this is due to the number of enemies, chiefly Kestrels, of which the lizards must constitute the sole food. But the most divergent island forms are again bound to those of the second denomination by a series of transitional types, so that

* The colours of European *Lacertidæ* can hardly be termed aggressive. For capturing their prey they are dependent alone on their agility, and though certain forms of coloration may "enable them to creep upon their prey" more easily, these have been developed solely, I venture to think, as a protection from enemies.

it may be practically impossible, without an exact knowledge of the economy of any given variety, to know in which class it should be placed. Nevertheless, the extremes are theoretically distinct, and such a classification as that referred to, though of no systematic value, may prove interesting from other points of view.

Other varieties whose coloration has been influenced by the direct action of external conditions, would again be apart by themselves. Of *L. muralis* some melanic varieties, if their colour had resulted from moisture of the surroundings or other physical causes, would serve as examples; other instances are given by Koch ('Formen, &c. der Ecaudaten Batrachier'), or M. Wagner ('Migrations theorie'). Colour-variation of this description will generally be correlated with structural differences. A hypothetical illustration: if a variety of *Proteus anguinus* were formed no longer inhabiting dark caves, the change in colour thereby entailed would doubtless be followed by important modifications of structure.

Lacerta muralis is generally seen hereabouts in sufficient numbers towards the middle of April, though of course the time of its appearance is regulated by the state of the weather. My earliest note for the Bavarian Palatinate is March 19th, when I observed one male near Birkenhördt, but it has been seen as early as March 1st near Kreuznach. Both these dates are exceptional. At the Laacher See, in the Eifel, which I recommend to naturalists of all denominations, only two males were visible on a warm April 4th. Still it seems less susceptible to cold than *L. viridis*. I recollect seeing several young of this species at Fontainbleau on a very bleak October day, and in South Tyrol and Italy it may be observed sunning itself on warm stones surrounded by snow.

It occurs also at considerable altitudes. Thus it followed the Stelvio road a long way above Bormio. J. von Tschudi gives 3800 mètres as the highest point of its occurrence.

ON THE HERPETOLOGY OF THE GRAND DUCHY OF BADEN.

By G. Norman Douglass.

(Continued from p. 184.)

II.—Fam. Scincidæ.

Anguis fragilis, L. — There is considerable fluctuation in the numbers of this species (as with some other reptiles) from year to year, dependent, perhaps, on whether the season has been favourable to the production and growth of the young. But, on the whole, a steady decrease has been perceptible up to the spring of 1889, notably near the capital, where it was formerly common enough both in the town itself and in the immediate vicinity.

I have always come across it fairly abundantly on the neighbouring hills, in the wooded parts, as well as more particularly in the large sandstone quarries,—where it can often be discovered under the same stone with a *Coronella lævis* or *Tropidonotus natrix*,—but never in the actual Rhine woods. Near Baden Baden it may be seen in great numbers, and, in fact, throughout the whole Black Forest region and on the Kaiserstuhl. In the Bavarian Palatinate it appears no less generally distributed, showing, however, a decided preference for the more hilly districts, though it also occurs in the plain directly opposite Karlsruhe.

Full-sized individuals are rarely met with, probably owing to the wholesale destruction which this species undergoes. Needless to mention that it is considered highly poisonous by the country people, who further accuse it of a special tendency to be swallowed by the grazing cattle (thereby causing their death), and act accordingly. But, apart from this, and the annual destruction involved in the hay-making, a multitude of more natural persecutors take advantage of its insufficient means of self-defence and tardy movements, which seem to suggest blindness. Hence the obscure tints which harmonize admirably, in a general way, with the surroundings.* But within this restricted sphere

* I may refer to a curious instance of more specialised protective resemblance in a species allied to this, given by J. v. Fischer. Speaking of the Skink, he says:—"The wonderful similarity in the coloration of its head to the surrounding sand [the other parts of the body being described as varying in colour] renders it extremely difficult to distinguish the heads peering out of the sand."

of variability there is so much individual variation that it has been said that no two of this species can be found coloured alike.

The upper surfaces of Baden specimens rarely exhibit any decided lines or vertical markings, being usually of uniform shades varying between iron-grey and dark brown, sometimes with a rich coppery iridescence. Lower surfaces grey or of a reddish hue,—throat sometimes almost white,—and the black colouring of these parts, characteristic of the young, is here almost entirely confined to the females, and is of comparatively rare occurrence. This sex is also more inclined to retain the immature black dorsal stripe, which remains most pronounced, as we should expect, in the anterior portions of the animal. I obtained two specimens of a pretty variety near the Donnersberg, in the Northern Palatinate: back of a uniform stone-colour, sides pink coral, down the centre of under surfaces a thin black stripe. In the Alps, both black and bluish coloration of the lower parts is much more frequent, though I have never seen the var. *cæruleoventris*—of a "light sky-blue colour"—described by Mr. Geisenheyner.* With specimens in alcohol this effect is often produced by the black pigment shining through the opaque medium of the loosened epidermis.

The *cyanopunctata* form, mentioned by the same author, occurs also in Baden, but not, apparently, in such abundance as at Kreuznach, and in all the specimens I have examined the characteristic blue spots are not, as elsewhere, continued along the sides and lower parts. They are indiscriminately scattered over the back, perhaps more thickly towards the head, each occupying half a scale or less. This peculiarity seems hereabouts to be confined to adults, and Mr. Haendel, who has paid special attention to this point, tells me that the majority are of female sex. The origin of this coloration appears at present obscure, but it is certain that it cannot be due to any external cause, abrasion, &c., as the blue spots not rarely form longitudinal lines along the surface of the back.

Order III. Ophidia.—Fam. I. Viperidæ.

1. *Vipera berus*, L.—The Smooth Snake, *Coronella lævis*, is responsible for many of the reports of the frequency of Adders

* 'Wirbeltierfauna von Kreuznach,' 1888.

in some parts of the country. Its metallic coppery hue—the German popular "Kupfernatter" applies therefore equally to both—as well as the ferocity with which it resents attacks, are no doubt accountable for this confusion.

On the whole, I should call this species decidedly scarce (in comparison to other countries) in Baden, having not once met with it, even in the most suitable localities. Nüsslin* states that it is confined to the Black Forest with the river Murg as the northern boundary of its range, and he mentions the occurrence of the var. *prester* at Herrenwies, near Baden Baden.† At this latter place many claim to have observed it, but my belief has received a severe shock since a friend has written to say that after much trouble he succeeded in obtaining a "local" adder, which proved, however, to be merely a blindworm. I have myself spent several afternoons in looking for it on the rocks above the town, where it is said to be numerous.

Towards the eastern side of the Schwarzwald this species becomes more common, being reported as very frequent in the Swabian Hills; whereas in the entire central Rhine district it is referred to as scarce by all who have paid attention to this point. In the Bavarian Palatinate its presence has not yet been authenticated.

The colouring of this class of ophidians has been less influenced than that of others by the effects of "age, sex, season and locality"; terms which are often called into requisition to assist in explaining difficulties. This is partially true of the size, which varies both according to sex, the female being of larger dimensions, and locality, mountainous forms being somewhat smaller in size. I should consider it a mistake to attribute its absence in this part of Germany (as has been done) to the mildness of the climate, for on referring to a map, it will appear that its distribution has been determined by social rather than by physical causes, *i. e.*, that it has been less successful in its combat with other species than with the conditions of nature.

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* In 'Grosherzogthum Baden,' 1883.

† A local paper recorded the capture of a pair in July, 1887, near Weinheim, as a great rarity in that district. I note this because more recently it has been stated that the north of the Grand Duchy is entirely exempt from this species. Of course this may again be the result of an error of identification.

For while it is generally true that a large horizontal implies also a large vertical range, the causes which have led to this are by no means the same in all species. As at the high altitudes where *V. berus* is often found, its usual food—mice and other warm-blooded animals—no longer exists, it is obliged to content itself with a diet of the equally hardy *L. vivipara*, which will account to some extent for its dwarfed size.

There is little modification in the colour of this species during the growth of the individual, the adults remaining almost as brightly-coloured as the young. Relying entirely on its venom for self-defence, it has no need of positive protective colouring, as has been maintained, and it is pure chance if its tints are found to harmonize with the surroundings. This is sufficiently shown by the fact that hardly two are coloured alike, even out of the same brood. I have also not remarked any seasonal changes of colour in this species (after desquamation the hues are naturally more vivid); nor are there any pronounced sexual differences in colour, though some shades are more common to one sex.

Its varieties are unlimited, and have given rise to a great deal of confusion—witness many Italian herpetological works—between this species and *V. aspis*. There is much analogous, or parallel, colour variation between these two species, which are further structurally so bound together by a series of intermediate types that, according to some of the best authorities, no distinct line of demarcation can be drawn between them.

I am not aware that the red *Coluber chersea*, L., occurs in the Grand Duchy, but it does in other parts of Southern Germany, and I was interested to notice that it is accredited here, as in parts of England, with greater irritability than the other forms. It is noticeable that this colour is supposed, in other creatures also, to indicate the same temperament.

The black variety has been held to be peculiar to the female sex, probably because these exceed the males in numbers, and are less agile in escaping detection. It is found sporadically throughout the whole range of *V. berus*, but certainly in greatest abundance (though not exclusively), for some unexplained reason, in mountainous districts. I have caught one or two of the ordinary type above 8000 ft. elevation. This form has been known to produce young of the normal colour.

2. *V. aspis*, L.—The existence of this species in the extreme south of the Grand Duchy has at last been satisfactorily proved (see 'Zoologischer Garten,' 1890, p. 265), though it had been long suspected (ibid. p. 12). This isolated outpost has doubtless been reached from the Swiss Jura by way of Bâle, in the neighbourhood of which town it sometimes occurs.

In Western Germany it is cited from parts of Lothringen, but its distribution there is so far not accurately determined.

3. *V. ammodytes*, L.—A single specimen of this viper was caught, I think, about 1830, in Southern Bavaria, and served for the time to found its claims as a German species. These claims, however, have been shown to be null and void.*

Has any use been assigned to the curious little horn on the head of this snake? According to Leydig, it resembles in structure the wattles of gallinaceous birds, and we might infer from analogy that it served for the same purpose as those of different species of lizards. Similar protuberances are found on the heads of various other snakes, not the least remarkable being the double projection on that of the Cerastes viper, which, to judge by the shape of the head in other sand-inhabiting reptiles, would seem to be of considerable inconvenience to its owner. But its accompanying advantages must more than counterbalance this. Brehm suggests that these horns act as organs of touch, by informing the snake of dangers "which its eye, unaccustomed to the daylight, could not perceive."† They do not, however, appear to be particularly sensitive. It is also improbable, in view of the general adaptive tints of this species, that they should serve to inspire terror into the hearts of would-be persecutors.

Possibly they may be, as Mr. Wallace suggests of the Cobra's hood,‡ a lawful means of warning, whereby to escape any "experimental tasting" on the part of its foes, and to judge by the difficulty we ourselves encounter in distinguishing poisonous snakes, such a mark of recognition would no doubt prove advantageous. Still, this would be crediting the hawks and other birds which might pounce down upon it with extremely acute powers of vision.

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* 'Leydig, 'Einheimische Schlangen,' 1883, p. 31.

† 'Reptiles,' p. 486. ‡ 'Darwinism,' p. 263.

It is a significant fact that a considerable amount of variety is displayed in the form of these excrescences, and that among the individuals of one species this characteristic sign is not constant in size, that of *ammodytes*, for instance, being often no larger than that of *V. aspis*. It may be asked how the acquisition of the slight nasal projection in this last named—which looks like a transitional stage—can be of any value to its possessor.

But this reminds me of the gradations in the means of warning by sound exhibited by various snakes, which are referred to in Darwin's "Expression of the Emotions,"* whence we may gather that so unpromising an object as the slightly indurated tail-tips of our European vipers may be the foundation of an organ as highly developed as that of the Rattlesnake.

It would be interesting similarly to follow up the various minute steps by which an apparatus so perfected as the poison-glands has been formed. But the greater the specialization—*i. e.* divergence in one direction—the rarer are the connecting links. Still we find here, as everywhere, various degrees of perfection, though it has become difficult to trace how the venomous saliva has been gradually accumulated, intensified, and collocated into its convenient receptacle. Dr. Leydig relates how on exhibiting a *Coronella lævis* to some students at Tübingen, the animal inflicted a bite on his wrist, which caused his whole arm to swell up for some days. In this he recognised the possible commencement of the development of these organs: a concession for so staunch an adherent of the immutability of species.

But it is still more curious to see how, while some species are improving this chance of success by increased swiftness or by various methods of protective coloration, others—locally separated and working independently, as it were—have discovered the identical, and not the least peculiar, of the many contrivances to prolong specific existence.

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* 'Darwinism,' p. 109 *seq.*

used to fall dead down the chimneys of St. Katherine's Rectory here" (A. B.). In all probability the supply of Starlings will be much reduced after the severe winter of 1890–91 in England.

*Chough, *Pyrrhocorax graculus*, Linn.—Common in the Rosses, Aranmore, about Burton Port, at Bunbeg, and generally round the coast from Horn Head westwards. Choughs used to breed regularly in the mouth of a cave at Carrablagh below the house, but they were expelled by Grey Crows some fifteen years ago, and I have never seen them since in Fanet. I have seen Choughs, however, at Dunree and at the Gap of Mamore, in Innishowen, in 1880, at Horn Head in 1881, and at Malin Head in 1882. They breed also in many other places along the west coast of Donegal from Aranmore southwards. "Very common along the coast of S.W. Donegal, where they breed for the most part in inaccessible places in the sea-cliffs, though I have eggs taken from nests in inland cliffs. Some of these were taken from the same nest two years in succession, so that it is evident they are constant to their breeding-places. I have been told by Archdeacon Cox that they used to breed in numbers along the rocks by the Gweedore river [probably about Bunbeg]" (A. B.). The light-keeper at Fanet Point informs me that he sees a few Choughs every summer between the lighthouse and the Bin: he saw only one in 1890.

(To be continued.)

ON THE HERPETOLOGY OF THE GRAND DUCHY OF BADEN.

By G. Norman Douglass.

(Continued from p. 260.)

II. Fam. Colubridæ.

1. *Tropidonotus natrix*, L.—In this species the tendency to uniformity of colouring is more marked than in many colubrine snakes. Some Baden specimens have scarcely any traces left of the original darker markings, and become, with increasing age, either dark grey or brownish; a process which is carried still further by some southern forms.

To produce this effect, the conspicuous collar-mark, which has played part in so many fables, must also be effaced, and this is brought about by an interesting method. The original white

or yellow colour gradually assumes a dirtier tint, resembling a thin coating of brown dust, and becomes less sharply defined in proportion as the darker patches encroach upon it from all sides. These in their turn melt imperceptibly into the brown or grey colour of the head and back, and it is noticeable that the black border itself is often less intensely coloured with adults than with the young. Sometimes one side of the collar remains almost white, while the other has already nearly faded away.

To judge by a considerable selection of heads showing these transitional stages, I gather that the process is in all cases identical. In some Italian specimens all traces of the collar have vanished; with others, from Baden, they are still to be recognised, though merged into the surrounding colouring (two or three which were kept alive in the Karlsruhe Zoological Gardens had entirely lost this mark, as well as the darker spots on the back); and I see that a *Tropidonotus natrix* caught on the island of Oesel, off the Baltic provinces, was also without the yellow patch on the neck.* The fact that this particular 'direction of variation' should be followed in localities so far separated obtains in significance when regarded as a means of producing that uniformity of tints above alluded to.

On the other hand, the symmetrical rows of spots characteristic of the young are by no means always disposed to become less conspicuous. On the contrary, they frequently, by fusing together, develop either into transverse or longitudinal lines, which give the animal a marked appearance, and have led to the formation of distinct varieties. Owing to their less stationary habits, the varieties of snakes are locally not so restricted as those of lizards often are, but, on the whole, it may be said that the former set of varieties of *natrix* are more common to the west of Europe, the latter to the east.

I have not been able to determine satisfactorily the existence of the melanic var. *minax*, Bonap., within the Grand Duchy. It is found in the Alps, though not very abundantly (I have only come across it three times), and in Bavaria, but not, I believe, elsewhere in Germany; and the many reports of "black" snakes in Baden are perhaps due to the number of dark grey or brownish specimens. Like the Blindworm, this species fluctuates in numbers from

* Loewis, 'Reptilien Kur-Liv und Esthlands.'

year to year, and I note the year 1888 as one in which it was exceptionally common. It is found in all parts of the country, and is not rare near the town of Karlsruhe (Wild-park, Durlacher-wald, Beiertheim, &c.) On March 30th, 1884—an early date—I observed one lying on the ground in the neighbouring Hardwald beside a large Hedgehog; both animals were torpid with the cold, and the Hedgehog had evidently not the strength to begin its meal. *T. natrix* seems to be more susceptible than the Smooth Snake to sudden changes of temperature, and when overtaken by violent thunderstorms in summer, during which the thermometer often falls several degrees a minute, it may be found lying drowsy and benumbed by the roadside. I have found this species common in the Rhine Woods (Maxau, Forchheim, Neureuth, Eggenstein), as well as on the hills round Karlsruhe (Durlach, Steinbach, &c.), on the Kaiserstuhl and the Black Forest. In Elsass and the Bavarian Palatinate I have met with it once or twice—at Dahn, and several times near Wörth; but it is generally considered to be scarcer here now than formerly, notably in the northern parts. The same decrease has been reported from other parts of Germany, and has been attributed to its oviparous habits, which do not allow it the amount of independence required nowadays.

2. *Tropidonotus tessellatus*, Laur.—This species occurs in so many countries around Baden that I still cherish the hope it may turn up somewhere within the Grand Duchy. It was first discovered in Germany, near Ems, in 1819, by v. Heyden, who considered it to have been introduced by the Romans, like the Æsculap Snake.* Since then it has been obtained at several localities in the Middle Rhine district: St. Goar, Boppard, Loreley; and in 1871 was first mentioned from the neighbourhood of Kreuznach, where it appears to be sufficiently abundant, frequenting chiefly those parts of the river where hot springs issue from the ground, and living on fish. In the countries to the south and east of Baden it is found nowhere nearer than Southern Switzerland, Tirol, Lower Austria, and Bohemia.

Like *Tropidonotus natrix*, there are two varieties, distinguished by their respectively brown or grey predominating tints on the upper surfaces. They never occur in equal proportions,

* Fatio similarly thus accounts for the presence of this and the following species in certain portions of Switzerland.

one or the other being always preponderant. The grey form, at a distance, resembles deceptively *Tropidonotus natrix*, and these two species, besides presenting much analogous variation in colour—thus *tessellatus* is also liable to lose the collar-mark (*Elaphis flavescens* similarly) and to follow the same process as *natrix* in the gradual darkening of the fundamental tint—have much in common in their habits and mode of life.

The young of this species are coloured singularly like the Viper, and a specimen of the allied *viperinus* now before me is not to be distinguished from it, in its white and black pattern. The resemblance, however, is not mimetic, but purely accidental, as the adults do not possess it in so pronounced a degree.

3. *Zamenis viridiflavus*, Laur. — This is one of the most doubtful German species. Silesia on the east, and the Moselle Valley on the west, are the only localities in which its occurrence has been *suspected*.

4. *Elaphis flavescens*, Gmel. — I will briefly sum up the evidence* favouring the claims of this species to be considered indigenous to Baden :—(1). In 1782 Dr. Sander wrote to the 'Naturforscher' that two "tree-snakes" had been captured near St. Blasien, in the Southern Schwarzwald, and were preserved there. Leydig is disposed to regard this as conclusive ; however, I have myself seen *T. natrix* climbing trees, and have heard other accounts to that effect. (2). v. Heyden observed this species near Baden-Baden (presumably about 1820). (3). Dr. Weber, a meritorious herpetologist, cites a letter from a certain Dr. Stocker (1855), according to whom *Elaphis flavescens* occurs on the Jura, towards the W. extremity of Lake Constance ; and also a newspaper report (1871), stating that a large individual of this species was killed near Pforzheim, about 20 miles east of Karlsruhe. Is this evidence sufficient? It is uncertain whether Dr. Weber himself saw any specimens, and undoubtedly the strongest testimony is that of v. Heyden, who can hardly have been mistaken. The snake in the museum of Karlsruhe, labelled *E. flavescens* var. *nigra*, is only the melanic form of the preceding, (*Anguis Æsculapii niger*, Aldrov. = *Z. viridiflavus* var. *carbonarius*). Its origin is obscure.

(To be continued).

* As given in Leydig, 'Einheimische Schlangen,' p. 11.

a Quail in Donegal. Mr. Brooke shot one at St. John's Point in 1873, the only one he ever heard of in Donegal. (But see Thompson, 'Birds of Ireland.')

Pallas's Sand Grouse, *Syrrhaptes paradoxus*, Pallas.—A number of these birds visited Donegal in June, 1863. About Dawross and Naran, and at Glenties, several were shot. Two years later, Lord Francis Cunningham showed me stuffed specimens which had been shot out of this flock. Another specimen is in the National Museum. A still larger flight occurred in the spring of 1888 from north to south of Ireland. An account of this was given by Dr. Scharff in the 'Proceedings of the Royal Dublin Society,' vol. vi. p. 278.

(To be continued.)

ON THE HERPETOLOGY OF THE GRAND DUCHY OF BADEN.

By G. Norman Douglass.

(Continued from p. 341.)

II. Fam. Colubridæ (*continued*).

As regards the wider distribution of *Elaphis flavescens*, Schlangenbad (whence the name) is the classical locality in Germany. It was discovered here in 1817 by v. Heyden, and is very numerous, a considerable trade being carried on by the country people in supplying this snake to visitors. In the valley of the Moselle its occurrence is well-nigh proved; it also follows the Danube as far north as Passau, though there is no notice of its existence there since 1865. Reports of its capture in other parts of Germany have proved to refer to escaped specimens, or are due to errors of identification.

It was the opinion of v. Heyden that the Æsculap Snake had been imported by the Romans to their thermal stations; at the same time, on this assumption, its absence in similar localities remains unexplained. There is further a note* to the effect that some semi-fossilised vertebræ of a snake, found in Franconia, have been attributed by Prof. Nehring to this species, which would imply its former more extensive range.

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* Leydig, 'Thiere des Rhön,' &c., p. 114.

This snake varies individually in temperament, some being unusually pacific, while others are unruly and boisterous. The same might be said of *Coronella austriaca*, *Zamenis viridiflavus*, and many others, including *Pelias berus*, which, according to several writers, is occasionally of very complacent disposition. Amongst lizards a similar diversity prevails: Bell "could not induce" *L. viridis* to bite his hand, whereas other individuals of this lizard are most violent and irritable without any apparent cause; *L. muralis* also often refuses to give vent to those outbursts of passion to which it is so prone. Such traits are all exemplifications of the common phenomenon of individual variation in characters other than purely external, a sympton of peculiar interest from an evolutionist's point of view. All observers, studying one particular species, lay stress on the distinct natures and idiosyncrasies of separate individuals, pointing out differences which would remain unnoticed by the uninitiated. Instances might be multiplied to show that even with reptiles and amphibians, within their less complex sphere of action and passion, these are so considerable that "*quot homines, tot sententiæ*" might almost with equal justice be applied to them. The many records of strange fancies,* of curious sympathies and antipathies, of individual differences in intelligence, demeanour, choice of food, &c., are noteworthy as demonstrating the plasticity of the mental nature which is often, no doubt, severely put to the test.

Similarly, the nervous susceptibility appears subject to an equal variability. This is admirably illustrated in the case of *Hyla arborea*, some individuals of which are more liable to sudden changes of colouring than others. A singular and somewhat analogous instance with *Rana arvalis* is given by Leydig.† Every one who has kept numbers of a species under confinement has observed that the single individuals differ in their powers of enduring cold, heat, &c.

It deserves notice, too, that the locality seems in some degree, as with many higher animals, to influence the psychological constitution. Thus, according to Selys-Longchamps, the

* I will only quote the enormity of *Rana esculenta*, which was observed by a writer in the 'Vienna Ornith. Journal' (Jan., 1887) to seize a swallow resting near the water's edge, and to disappear with its victim into the deep.

† 'Zool. Anzeiger,' 1885, p. 756.

northern *Lacerta muralis* is less susceptible to the sound of music than the Italian race—a statement which I can bear out; the Sardinian Tree-frog is credited by another writer with a more "angry, passionate disposition" than the ordinary form, &c.

All such observations would be comparatively valueless were it not for the fact that definite tendencies, or directions of variation in habits and temperament, are characteristic of certain species. For the effects would otherwise, as with variability in size, or structure, or colour, be "swamped" or neutralised. As it is, we can understand how, under circumstances perpetually changing from an economical and physical point of view, a differentiation in habits may often prove beneficial, if not essential, to the welfare of some members of a community; and this, in its turn, may entail a modification of parts sufficient to warrant the creation of a 'Nova species.'

5. *Coronella austriaca*, Laur.—The Smooth Snake is not found, I believe, in the actual Rhine-valley, but is sufficiently common on the hills, chiefly in old disused sandstone quarries. Five or six can be obtained in an afternoon without much trouble.

The extreme length of 80 centimètres, often cited, seems a trifle exaggerated, as the Baden specimens, which are by far the largest I have seen, seldom exceed 65 cm. The parallel rows of spots on the back are preserved intact only by the young; whereas with increasing age they tend to coalesce into longitudinal bars, or to form a cross-striped figure, though neither of these patterns are very marked. At other times they become indistinct, in which case the two lateral lines are the first to fade, leaving often only the dark streak through the eye as vestiges. The markings always remain most pronounced in the anterior portions, and the head generally retains to the last the three characteristic transverse stripes. The lower surfaces are reddish with the young, as with English specimens, and darken gradually to a uniform brown with opalescent lustre. The throat remains throughout of a lighter tint. Along the edge of the ventral plates two scarcely perceptible lines of lighter colouring may sometimes, as with *Elaphis flavescens*, be seen.

According to Prof. Nüsslin, a bicephalous individual of this species was caught in 1881 not far from Karlsruhe, and kept alive for some time. This peculiarity does not seem to be as

rare as might be supposed. De Betta records other instances with lizards, *Vipera aspis*, *Tropidonotus natrix*, and one with *Anguis fragilis*. They were all young specimens, and lived but a short time; in the last-named case one head survived the other by about two hours. More recently an interesting account has appeared in an American journal of a double-headed Tortoise, whose two heads performed independently the functions of eating, sleeping, breathing, &c., and appeared also to possess different temperaments.

This snake can sometimes be seen nodding its head, as lizards often do, with a sort of contemplative expression. It was perhaps from noticing this attitude that the observing ancients first called it *drakon*, the animal which looks or regards, rather than solely on account of the brilliancy of its eyes.

And while I am digressing, I may call attention to another point, *viz.*, the signs of attachment to the young or the eggs evinced by this class of animals, instances of which have been given at various times. It appears certainly remarkable that an animal so comparatively low down in the scale should show any care for its offspring; yet we have the frequently quoted testimony of Dr. Settari, who watched a *Coronella* feeding its young with small lizards, which it had previously swallowed. The evidence as to Adders and other snakes allowing their young ones to retreat into their mouth ("swallowing their young") when alarmed by sudden danger, has now become too overwhelming to admit of doubt. Referring to the care of eggs, there are accounts of large storages of eggs discovered in cavities of the ground, which appear to have been simultaneously and purposely laid there by a number of individuals; and we have further the occasional congregating of snakes in masses—notably *Vipera berus*—during the breeding season, which is important as leading possibly to these large deposits of eggs. Gené observed a similar gathering of more than two hundred *Coronella austriaca*, as well as, not far distant, four assemblies of other snakes, which met at the same time and place for eight consecutive years:—"E rivedendo per varii anni de seguito quei luoghi, rividi gli stessi amori e gli stessi innamorati."*

As regards the further distribution of this *Coluber* in Germany,

* Cited by Leydig, 'Einheimische Schlangen.'

it occurs, apparently, in all districts sufficiently dry, but has a decided preference for the hills. In the Alps it rises to a considerable altitude (1900 mètres, according to Fatio); and the few I have caught there, in the eastern portions, are not so brightly coloured, even when young, as those from Baden. In the Palatinate I only obtained one young specimen near the Madenburg, with the light red inferior surfaces; but it is considered fairly abundant throughout the country.

Amphibia.

Order I. Anura.—1. Fam. Ranina.

1. *Rana esculenta*, L.—Plentiful throughout the Grand Duchy, save perhaps in some of the more barren and exposed parts of the Schwarzwald. It is most abundant in the large forest belt bordering on the Rhine, whose numerous inlets and connecting streams resound with its melodious concerts. Common enough near Carlsruhe:—in the River Alb, already mentioned; in the small lake of the Stadtgarten; in the fountain of the Schlossgarten, and the ponds of the Wildpark. There was formerly also a small colony in some ditches on the Exercierplatz, of which there are now no traces. I have not missed it anywhere in my excursions through the Bavarian Palatinate and Elsafs.

R. esculenta is visible in favourable localities up to the middle of October, but is far behind the Common Frog in its spring appearance, being seldom in full numbers till the end of April. Single individuals can be met with by the 20th March. Even before this they are roughly awakened by the professional frog-catchers who invade their muddy retreats and carry on a successful business for those who appreciate this delicacy. I have several times caught specimens swimming awkwardly *minus* one limb, who doubtless owed the preservation of their lives to a vigorous and unexpected jerk of the remaining member; but never altogether deprived of their legs, so that I imagine the frog-catchers are fairly merciful, hereabouts at least.

Being pre-eminently aquatic, this species is seldom found far from its element, and if by chance this does occur (for batrachians are often found in the most incomprehensible situations) the skin becomes warty and discoloured. In turbid water and shaded ponds of which the bottom is covered with an accumulation of

dead leaves, &c., it assumes a variable protective resemblance to the surroundings. The chromatopheres are also very susceptible to atmospheric changes.

Several writers have observed a tendency to blue coloration in this species. I obtained an interesting variety of this nature near the village of Forchheim, in a pond in the Rhine woods: the darker markings on the back were perfectly normal, but the green, instead of displaying the yellow fundamental hue, was of a verdigris tint, imparting to the frogs a most curious appearance. I forwarded some of these to Prof. Leydig, who said that the blue colour had not been affected by the journey, but that the day after (having in the mean time assumed a "dark-blue" tint) they were transported in a sack for a short distance, and on being suddenly exposed to the full sunlight the colour rapidly changed to a "light-bluish white." This was due to the contraction of the colour-cells; at the same time he considered that there must have been some permanent modification to produce the original blue colour. I observed this singular variety for three consecutive years at the same locality. The peculiarity, though commoner to the female sex, was exhibited equally strongly by some males, and as other specimens of both sexes showed no traces of it, I should be disinclined to attribute it to the influence of purely external circumstances.

The other variations in colour are produced by the various shades of the fundamental tint, or by the accentuation of the three light-coloured bands on the back. As a rule, the dorsal one is the most pronounced; at other times this is nearly effaced, and the lateral row of pores becomes prominent. A male variety, not rare in the Rhine district, has the head of a nearly pure gamboge colour, as well as a small patch of the same colour on the throat. The yellow pigment on the flanks and hind legs varies considerably in degree.

As naturalists experience some difficulty in catching sufficient numbers of this frog, owing to its extreme wariness and swift movements, I will describe a method of capture which far supersedes the unsatisfactory one usually employed. The intending angler, having attached a small piece of red cloth by way of bait to his line, must hold this touching the surface of the water. He will be astonished to see the frogs (especially in the spring months) wildly endeavouring to seize it, and literally struggling

with each other for the possession of a mouthful. Two or three can be landed simultaneously till a sufficient quantity has been obtained. This may sound improbable: *fiat experimentum.*

As regards the distribution of *R. ridibunda*, Pallas, in Baden, I regret very much being unable at present to include it in this list. Since the publication of the papers* describing this form, a number of successful observers have recorded it from various districts in Germany, chiefly Central and Northern. Unfortunately my free time for observation was very limited during the last years of my residence there, and since the spring of 1889 an entire lack of correspondents has prevented my hearing of its capture. A doubtful specimen has been identified through the kindness of Mr. Boulenger as "*R. esculenta typica.*"

2. *R. fusca*, Roesel.—This species has greater capacities for accommodation than the others, and is accordingly well-nigh ubiquitous in Baden. This flexibility further shows itself in the production of a large number of varieties, some of them distinct enough to have perplexed systematic naturalists, while others are only slight modifications of colouring.

Of these latter the form so common in England and Scotland, with the yellowish back indiscriminately blotched with deep black markings, is comparatively rare in the Grand Duchy (it seems to be more common on the Lower Rhine), as also the female form, conspicuous by the bright red colour of the under surfaces, which is abundant in Alpine districts. I have never observed green coloration in any part of the body. The shape of the snout is much less constant than with the following species. The true *platyrrhinus*, Steenstr., of more substantial size and generally rougher skin, is frequent in the hilly parts of the country; while in the Rhine woods I have come across a smaller variety, which I should be disposed to class as the *acutirostris* of Fatio. I have also captured several of the barred var. *striata*, which seems to be sporadically distributed. Their resemblance to *R. arvalis*, though very striking, betokens no relationship, and is only another instance of the curious parallel variability previously noticed. The throat of the male usually assumes the seasonal bluish tinge; in some cases the back is similarly of a pale violet-grey of a very ephemeral nature.

* G. A. Boulenger, 'The Zoologist,' 1884, p. 220; 'Proc. Zool. Soc.' 1885, p. 666. (See also 'Proc. Zool. Soc.' October, 1891.)

I observed a well-marked local variety in the marshy tract where the following species occurs. It is the var. *cinerea* of Koch,* described as:—"A smaller form, resembling a hybrid from the slim character of its build. The protuberance at the base of the fifth toe is normally developed, but the snout is more pointed than with the typical form, thus recalling *R. arvalis*, from which, however, it again differs decidedly by the normally webbed feet, and by the shape of the protuberance. The individuals before me measure 40 to 45 millimètres from the snout to the root of the hind legs. The colour varies between dark ash-grey and brownish-grey, the lighter bars along the sides are completely absent, and the entire upper surfaces (including head) are covered with large and small deep-black spots. These are not, as with the var. *typica*, continued along the hind legs in the form of stripes, or in any case only appear indistinctly as such; the ear-mark is black, with grey spots. This form is rare, and occurs on the peaty ground of the Schwanheimer wood, and elsewhere in the plain. . . . ." It is a very constant form, the young resembling the adults of both sexes in their speckled markings, and appears to be restricted to this locality.

In consequence of its hardy constitution, this batrachian may still be found at the approach of winter, when the others have already retired. I have seen it up to October 21st and November 1st, and again as early as February 9th and 2nd. But these dates are exceptional for the climate of Baden. The deposit of the spawn is regulated by the state of the weather, and seldom takes place before the first week in March.

The proportion of the sexes seems to fluctuate according to locality. On the whole, the males preponderate considerably, though never to so large an extent as, for instance, with *Bufo vulgaris*.

3. *R. arvalis*, Nilsson. — The distribution of this interesting batrachian is becoming defined with more certainty day by day, in proportion as observers convince themselves of its "specific" distinctness from the foregoing. Without enumerating the many isolated localities, chiefly moorland and peaty districts, where *arvalis* has survived, "a relic of the Glacial Period," up to the

* Koch, 'Formen, &c., der Ecaudaten Batrachier,' p. 140.

present, it is evident that these colonies become fewer and further between as we descend from the north. I presume Transylvania marks, so far as is yet known,* the limit of its southern extension.

In Baden it has been cited from various points of the Rhine Valley,—Manhheim, Freiburg,—and I was fortunate in coming across a new settlement near the village of Eggenstein (about four miles north of Karlsruhe), where this species occurs in great abundance, together with *R. esculenta* and *fusca*. The locality is a swampy depression in the otherwise well-cultivated fields between the village and the Rhine woods, more or less flooded in spring by a small stream running through the centre, while in summer the ground is usually dried up. Though I have never found *arvalis* far beyond the precincts of this, I have no hesitation in predicting that it will turn up duly in many of the similar tracts along the upper Rhine Valley.

The coloration has been so often and admirably described, that I will only note a few points with reference to these individuals from Eggenstein. As I have elsewhere observed,† the striking appearance of the four light-coloured longitudinal fasciæ is more common with the females and young, while the males incline to uniformity of tints. Still, one may also see young and females plainly-coloured, as well as distinctly-striped males; and these dimorphic types, though most pronounced in their extremes, are connected by an unbroken series of gradations. The delicate blue or purple complexion of the males is subject to some variation in degree, being naturally most intense with those individuals which possess that flaccid and loose appearance due to the distention of the lymphatic vessels. As may be expected, it is most pronounced on the throat, though visible also along the sides and back. It gradually vanishes towards the beginning of May, when the other peculiarities of the nuptial costume are in retrogression. The fore legs of the male, whose functions are analogous to those of the hinder legs in lizards, are, like these, disproportionately thickened, and the animals appear at this season even more swollen than *R. fusca*, on account of their slighter build and more pointed snout. The yellow of the sides and hind legs is often very brilliant even with the young, princi-

* V. Méhely, 'Zool. Anzeiger,' 1890, p. 445.

† 'Zoologischer Garten,' 1889, p. 221.

pally with the striated variety. I have detected no traces of green colour. It is worthy of note that the throat, generally pure white or of a bluish tinge, is, with some females, spotted like the lateral portions, and in the corresponding male form of a uniform dark iron-grey; in both cases with a white streak down the centre. This detail becomes more significant when we encounter an identical sexual difference with individuals of *R. fusca*.

Turning to some points of biological interest, it has struck me that the proportion of the sexes is more evenly balanced here than with most batrachians. It seems remarkable that this boreal species, which we should imagine to be less susceptible to cold than *R. fusca*, should nevertheless spawn three or four weeks later: it is as though this habit, necessitated formerly by a more rigorous climate, had been permanently inculcated into the constitution, and we are led to speculate in how far the advantages conferred by such peculiarities—*cf. R. ridibunda* and *Bombinator bombinus*—may have played a part in the gradual differentiation of specific forms. But in the vast majority of cases it is vain to decide the priority between change of habits and modification of structure.

R. arvalis emerges from its winter quarters at Eggenstein towards the end of March. The spawn is not deposited till the beginning of the following month, and then by no means always in the water, but on comparatively dry land (hence distinguishable by its small size from that of *R. fusca*); with the result that, if there is a spell of three or four hot days during the season, great quantities become dried up and wasted. The frogs themselves suffer much from these temporary droughts: the males especially, in their redundant condition, may be found in numbers lying dead or dying on the ground. Whenever possible, they bury themselves under tufts of grass so effectually that, before I was aware of this habit, I imagined the entire colony had emigrated to new pastures, leaving only the unburied dead behind them.

Their aversion to remaining long in the water was also not explained till, after capturing several injured specimens,* I

* Mostly deficient in digits or entire limbs. The same applies to *R. fusca* and *Bufo vulgaris*, which often exhibit curious malformations. The injured part is but seldom renewed in its entirety, as with newts, but only replaced by an indurated growth covering the exposed surface, or forming, in some

noticed that the small stream referred to was full of young pike. They have evidently not that confidence in the element displayed by the edible frog, for, though they jump momentarily into the water on being pursued, they immediately proceed to climb up the bank again, and seek refuge on dry land. This behaviour is singularly analogous to that of the marine *Amblyrhynchus*,* and seems, like it, to be induced by a "fixed and hereditary instinct" of which we may recognise the probable origin in the imperfectly developed web of the posterior feet.

4. *Rana agilis*, Thomas.—This is another of the species whose existence in Baden has not yet been verified. I recollect, about 1884, finding a frog in the "Wildpark" of Karlsruhe, which struck me by its prodigious leaps and the peculiar long-drawn cry which it emitted on being captured; but otherwise I took no further notice of it. Without attaching any importance to this, I cannot help thinking that, in a country so favourably situated as Baden, the presence of this batrachian has as yet merely been overlooked through the paucity or absence of sufficiently eager observers.

It was first signalled as a German species by Dr. Boettger from the neighbourhood of Strasburg,† later on by Leydig‡ from near Würzburg, two points between which a great part of the Grand Duchy lies. It has already been recorded from Switzerland (Fatio, 1861), Hungary (Méhely, 1890), Bohemia (Wolterstorff, 1890), besides a large part of France, so that it will presumably turn up in more localities of the intervening part of Germany.

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rarer cases, an incomplete physiological substitute for the lost member. Owing to the position of the eyes, frogs have some difficulty in seeing what is directly before them, and may sometimes be seen, when swimming rapidly, to strike with the snout against the leaves or stalks of aquatic plants. But for many injuries to batrachians it appears we must hold the mollusca responsible. One observer relates how a *R. esculenta*, in its precipitate haste, was received head foremost into the opened valves of a mussel, to the surprise, doubtless, of both parties. I observed a case of multiple digits with a *Triton marmoratus*, from near Paris, which possessed no less than eight toes on one front foot (otherwise normal). This may have been congenital.

* Darwin, 'Voyage of a Naturalist,' p. 387.

† 'Zoologischer Anzeiger,' 1880.

‡ '*Triton helveticus* und *R. agilis*,' 1888; and 'Uber unsere braunen Frösche,' 1889.

In some works on the subject this frog is described as of a uniform white colour on the lower surfaces. This is misleading, inasmuch as a distinct network of yellow or reddish colouring between the fore legs can be often detected, and such a statement might cause more hasty collectors to reject this species as a variety of *R. fusca*. The darker streak from eye to eye, perceptible with many batrachians, reptiles, and, curiously enough, among the higher classes of vertebrates, is here rarely absent. Still, this is by no means an infallible mark, as some specimens show no traces of it.

I am not aware whether this species has been mentioned from Meran, in the Tyrol. I obtained there, in 1887, some specimens of the normal type.

NOTES AND QUERIES.

Death of Mr. Charles Jamrach.—With the death of Mr. Chas. Jamrach, at the age of 76, on Sept. 6th, a notable character has disappeared. He was a London merchant, and the commodities in which he dealt were wild beasts. For many a year Mr. Jamrach had traded in this curious kind of stock, as his father had done before him, and his place of business in Ratcliff Highway had long been a sort of Mecca to pilgrims interested in his peculiar wares. Here a tiger might be purchased with no more words than need be expended over the sale of a horse, and an elephant bought as readily as a pair of pigeons in the Seven Dials. A lively crocodile or rattlesnake was always on hand for any one with a weakness for that kind of pet. Here a cockatoo chattered on a perch, hard by a cage in which a dozen or so monkeys hatched plots against its crest and feathers. An anteater lay beside the stove, while an ugly baboon muttered and grumbled over its captivity. Anything or everything could be bought here or obtained within a reasonable time, provided the purchaser was willing to pay the price. Mr. Jamrach had "relations" with the wild-beast men all over Europe; and there was, perhaps, not a Zoological Garden from Stockholm to Naples where he was not well known. His establishment was no doubt one of the sights of London. But after seeing his beasts and birds, his creeping things and his crawling things, and after listening to his professional talk, the visitor left in doubt whether there was any curiosity in his place to equal Mr. Jamrach himself. Certainly to those who like to study their species, the men who came to sell and the customers who came to buy were quite as entertaining as the articles in which they dealt. If a foreign ship had come into port, the chances were that before long he would be visited by some of the crew.