EDIBLE SNAILS.

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INTRODUCTION.

FOR many years edible snails have had a place upon the menu in various European countries, but it is in France that the greatest numbers are now consumed. It must not be inferred, however, that snail culture originated in the above-named country, for Pliny the elder tells us that a certain Fulvius Hirpinus first instituted snail preserves at Tarquinium, a Tuscan city not far from Rome, about 50 B. C. There the mollusks were guarded in inclosures and fed on meal and boiled wine until fat enough for use. By a combination of careful breeding, selection, and feeding, very satisfactory results were attained, and we read that the snails attained a large size and very agreeable flavor.

During the growth and expansion of the Roman Empire snail culture was introduced into the countries subjugated by the Caesars, and in this manner the industry became established in Switzerland and in the provinces bordering on the Danube, where it was still flourishing during the Middle Ages. From Ulm, in the Swabian Alps, 10,000,000 snails were annually sent down the Danube to Vienna and the Austrian convents, where they were eaten under the name of fish during the lenten season.

With the ultimate extinction of cheap water transportation this market was lost, but the industry still persisted through many vicissitudes until a safe and sure market was found in France during the latter part of the eighteenth century. The introduction of the mollusks as an article of food was in the following rather haphazard manner: French wine merchants, who yearly went to Burgundy on buying trips, were compelled to stop at the posting inns, where they

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were frequently served with snails gathered from the surrounding vineyards. This unusual but savory dish was commented upon by the merchants when they returned to their homes, and thus interest was gradually aroused to the point where one of the coaches plying between Paris and Auxerre was commissioned to bring the first baskets of snails to the French capital. About 1850 the trade in Burgundy snails was greatly stimulated by the advent of the railroad, for they could now be transported to greater distances while still fresh. Thus new markets were developed in France, Italy, and Spain. Snaileries have become common in many sections of central and southern France, northern and central Italy, Spain, throughout the Swabian Jura, Württemberg, Baden, and in the villages of the Danube and Lauter Valleys, the town of Gutenstein alone having gardens in which several million snails are fattened annually.

SPECIES EATEN.

In most critical markets the large, white snail (*Helix (Helicogena) pomatia* Linn.) is the one preferred, but the common garden snail (*Helix [Helicogena] aspersa* Muller) and the wood snail (*Helix [Tachea] nemoralis* Muller) are also widely eaten, especially by the poorer people, as they do not command the price which the former bring. In addition, *Helix (Tachea) hortensis* Muller, *Helix (Helicogena) aperta* Muller, *Helix (Euparypha) pisana* Muller, *Helix (Otala) vermiculata* Muller, and *Helix (Otala) lactea* Muller are all eaten to a greater or less extent in different places, while in and around Marseille *Helix (Helicogena) melanostoma* Draparnaud is preferred by the epicures. In Italy the edible snail is generally *Helix (Helicogena) lucorum* Linn., and in Mexico *H. aspersa* has been acclimatized, and an indigenous species (*Lysinoe humboldtiana buffoniana* Pfeiffer) is also eaten. In England a few snails are consumed, generally *H. pomatia* or *H. aspersa*, which latter is believed to be native to the island; while in the United States of America such snails as are found upon the market are usually *H. pomatia*, which are brought over from Europe alive in barrels and casks.
CLASSIFICATION AND GENERAL HABITS.

Many edible snails belong to the family Helicidae, which are land snails, and most of those eaten by Caucasian races belong to the genus *Helix*. All are *hermaphrodites*, mostly with vegetarian tastes (but sometimes eating animal substances), found in woods, fields, gardens, cellars, old walls, or upon open plains, mountain sides, by bodies of fresh water, and near the sea. Most of the species are nocturnal and prefer shade and moisture, but some few emerge from their hiding places by day and seem to delight in the sunshine. All are protected by a spirally coiled, more or less globular shell, into which they can retire as occasion demands, the mouth of which may be sealed by a film or epiphragm excreted by the mantle. Furthermore, the body is protected by an exudation of slime, which serves not only to exclude the air, thus preventing a fatal amount of evaporation, but may also act as a deterrent to foes, such as birds and small mammals, which might otherwise prey upon them.

DESCRIPTION OF THE PRINCIPAL EDIBLE SPECIES.

(*Helix* [Helicogena] *pomatia* Linn.)

Body obtusely rounded in front, narrowing gradually behind to a slender tip, yellowish-gray, sometimes with a brownish cast, covered throughout with large oval, pale yellow granulations between which the dermis shows grayish; mantle (that part of the mollusk which secretes the shell and covers the visceral cavity) furnished on its upper part with three prominent, fleshy lobes; tentacles (feelers) two in number, long and cylindrical; eye-stalks two, each with a small globular eye at the end; foot (part of the body on which snails travel) large, broad, rounded in front and obtusely pointed behind.

Shell globular, thick, strong; whorls (turns of shell) four or five in number, well rounded, separated by a narrow suture (the line of junction between the whorls); umbilicus (perforation at base of shell) narrow and small; aperture (mouth of shell) nearly round; outer lip thick, usually reddish-brown inside, inner lip merely a callus covering the preceding whorl. In coloration the shell may be yellowish-white to brownish; usually banded with four to five brown
spirals on the last turn, which may converge and meet on the earlier whorls, where only two or three may be apparent. Sometimes this darker coloration becomes diffused and may cover more or less of the entire surface of the shell.

LIFE HISTORY.

As there is a great similarity in the life histories and general habits of all the edible Helicidæ, we may avoid unnecessary repetition by following the most important commercial species (H. pomatia) in its course of development.

During June or July the eggs, some 50 or 60 in number, are deposited. They are about the size of a small pea and greatly resemble mistletoe berries both in color and in consistency, or, as some one has remarked, might be mistaken for a homeopathic pill. A thin, globular, calcareous shell incloses the gelatinous portion of the eggs, which are laid in a cluster in a hole in the earth which the snail digs with its foot. Hatching takes place in about 20 days, and when the young emerge they immediately make their first meal from the pellicle of the egg just vacated. The shell of the newly hatched snail is very delicate and easily injured, but soon hardens in the air. Growth is very rapid, and by autumn they have attained the size of a large marble and are quite fat and well conditioned, as they have been eating ravenously preparatory to a long winter’s fast. When the first frosts come these snails become inactive, almost cease eating, and congregate in masses. Then each one digs a hole with its foot just large enough to accommodate the shell, and after lining this hole with dead leaves and slime from its mantle, the mollusk turns the mouth of its shell upward and closes the aperture with a thick calcareous lid called an epiphragm, which is excreted by the mantle. Thus protected from the elements all bodily functions are suspended, and the inmate passes the winter in a torpid condition. With the advent of warm weather in the spring the epiphragm is thrown off and growth recommences. Copulation takes place during May or June and a few days later the eggs are laid. Although the snail is now sexually mature, it may not reach its maximum size until the second summer, when it should be from 1½ to 2½ inches in height.
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and vary from creamy white to dark brown, either with or without stripes. The natural life of *H. pomatia* is about 6 or 8 years, and eggs are produced every summer.

COMMERCIAL PRODUCTION.

In Europe, when snails are raised commercially, they are placed in inclosures called "pens," "parks," "gardens," or "farms," prepared somewhat after the following manner, a plot from 25 to 30 feet square being sufficient for about 10,000 snails: A piece of moist calcareous soil is selected, a hillside being preferable because well drained, and calcareous ground chosen because the snails need plenty of lime in shell building. Around this plot a substantial wire fence a foot or two high is built as follows: A trench about a foot deep is dug around the edge of the proposed inclosure and at the corners substantial posts are planted and other intermediate posts are placed as necessity demands. These are now connected by a solid base of boards or by a cement wall built in the trench. This base extending below the surface of the surrounding ground is to prevent the snails escaping below the fence. The base, if of wood, should also extend a few inches above the ground, in order that wire netting may be tacked to it, as described later. If cement is used, the wall should extend to the level of the surrounding ground, and on this a wooden stringer should be placed, to which the wire may be fastened. Next, the posts at the top are connected by wooden stringers heavy enough to give rigidity to the whole structure. To this framework wire netting may now be fastened, using a mesh small enough to prevent the snails crawling through, yet so large that they can not climb over. The trench may then be filled up and leveled off, so as to conform to the rest of the inclosure, the surface of which is then strewn with from 2 to 4 inches of moss or chaff, into which the snails can burrow during unfavorable weather. Sometimes bushes are planted in the inclosure or piles of brush are so arranged as to afford dry and airy shelter during light showers, or shade when the sun is too fervid. It is also advisable to build small roof-like shelters about 6 by 3 feet, under which the mollusks can congregate in order to escape either heat or cold. The pens should be traversed by walks,
so that all parts are readily accessible for the scattering of food or for cleaning. The latter is essential, as during damp weather the moss and bits of food become covered with slime and excrement, or putrify, and are sources of infection, which causes the loss of many of the snails through disease. Really, the best method is to have the snail garden divided into at least two sections, to be used alternately, one section to be thoroughly cleaned and aired while the other is in use. Overcrowding should be avoided, and during hot weather the moss should be sprinkled several times a day in order to insure the right degree of moisture, which is essential to the snail's good health.

The crowded condition of European countries is responsible for the above-described intensive system of snail culture, and it is equally applicable to the more densely populated sections of the United States, but in the Southern and Western States of our Union overcrowding fortunately does not exist as yet, and farms are usually of more ample proportions than those of the recognized snail-producing countries. In view of this fact, snail growing may be a very simple matter in most parts of the United States, for all that is required is a bushy hillside, or, preferably, a limestone bluff near water and partially covered with vegetation, and a few snails with which to stock the preserve. They will require no further attention, as they do not wander far and are perfectly capable of obtaining both food and shelter from the wild plants which cover their domain. There they will multiply, and every farmer might not only have his own supply to replace (at least in part) the widely used oyster, but might also supply his less fortunate city neighbor, with profit to both.

In Europe the peasants go out into the woods, fields, and vineyards as soon as the snails appear in the spring and collect them for the snail farmers. For this work they receive from 40 to 80 cents per thousand snails, and, as one person can gather only 1,000, or with good fortune, 1,500 per day, it can be readily seen that the work can scarcely be classed as very profitable. As the snails are gathered they are taken to the snail farmers, who buy according to the prevailing price in Paris.
During this handling the active, well-nourished, and consequently tender and juicy mollusks are easily damaged and may die of their bruises or from confinement, so the careful snail grower avoids purchasing those with bruised, battered, or cracked shells. Even after the snails have been placed upon the moss in the inclosures, danger is not passed, for they soon congregate next the fence, where they form piles so high that the topmost ones may crawl over and escape. Even if the fence is too high for this, the massing is very injurious to the snails at the bottom, for they are either starved, smothered, or die from becoming overheated or fouled with excrement and slime. Therefore they must be redistributed over the moss every little while, and this again is a source of loss, for in the process some are crushed, or killed outright, while other shells are broken, thus retarding growth while repairs are made, and, if the injury is extensive, unfavorable weather, disease, or parasites may cause death. Sudden changes of temperature are also very disastrous to these soft-bodied creatures, and many are overtaken in autumn by frost before they can bury themselves, so whenever sudden cold snaps occur moss or blankets should be spread over the snails as a protection when practicable.

FOOD.

Many kinds of food have been tried on the snail farms, but the usual diet consists of cabbage, lettuce, endive, chopped kohlrabi, dandelion leaves, or potatoes. In some snaileries bran mash is given, and fruit, when very cheap, can be fed to advantage, as it is greatly relished by all snails. Sometimes a few aromatic herbs are planted in the inclosure or scattered with the other food, and it is claimed that they greatly improve the flavor of the mollusks. As snails feed mostly at night, it is advisable to distribute their rations well over the snailery just after dusk, at which time the inmates emerge in greatest numbers. Their sense of smell being very acute, the snails soon find their food and attack it by means of the tongue, or radula, which is ribbon-shaped and beset with rows of hundreds of sharp teeth of microscopic size. Care must be taken that the snails do not over-
eat, for if they are allowed too much of some favorite food they will gormandize to such an extent that fermentation sets in and the resultant gases distend or rupture the tender gut and death ensues.

**HIBERNATION.**

After feeding all summer the snails become very fat and of a semitransparent greenish-white color, much like the cabbage on which they have fed. But with the approach of autumn they grow listless, quit feeding, and, in the free state, burrow 4 or 5 inches into the soil, where they seal themselves up by forming a calcareous epiphragm across the mouth of the shell. In the gardens, however, the snails are prevented from going into the ground by its hardness, so all they can do is to burrow down into the moss, from which they are easily raked out when wanted. Often they are taken out early in the season and stored on trays in a cool warehouse until wanted for market, to which they are shipped while still in the dormant state; bringing from $1.50 to $3.50 or more per thousand, according to their abundance. In this condition they can be kept for months, without deterioration; in fact, snails have been known to live for 3 or 4 years without food. Some, however, possibly on account of improper nourishment or other weakness, never form more than a thin, fragile film across the aperture of the shell, and so must be used comparatively soon, as they are of a perishable nature. These "glass snails," as they are called, together with the "runners," which never form an epiphragm, bring only about $2 per thousand, on account of their limited keeping qualities.

**MARKETING.**

As is well known, Paris is the greatest of all snail markets, but it is really surprising to learn that more than 200 millions of snails are disposed of during a season, which is of the same duration as our own oyster season—September to April. Another authority says that 50 tons of snails are consumed daily in Paris alone when trade is at its best.

Commercially, only two kinds of snails are recognized in the French market, the "large white Bourgogne" and the "small gray." The marketing season is also divided into
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two parts, the first from April 15 until June, during which time the snails are gathered in field and vineyard after rain or early in the morning. These snails are, of course, in the active stage and perishable; therefore they must be disposed of rapidly, and do not bring such high prices as do those sold in the fall. Those which go to the great Central Market (Halles Centrales) are packed in well-ventilated cases, sacks, or baskets, each holding from 500 to 2,000 snails. A thriving business is also done at this season by push-cart peddlers, and, owing to the enormous numbers which are brought in during this time, prices are very low, "large whites" bringing only $1.50 to $2 per thousand, while the same quantity of "small grays" may sometimes be had for 40 or 50 cents.

The second season lasts from September to May, and is divided into two parts, the first of which embraces September and half of October. Most of the "glass" snails appear during this time, for they were gathered in the spring and were kept in pens, but without much care, so that through weakness, neglect, or unnatural conditions the epiphragm did not fully develop.

Of course, they must be used within a short time, but owing to the great demand at this season of the year they bring a good price. Most of them are sold by private contract to grocers, restaurants, wine merchants, etc., and bring from $2.50 to $3 per thousand for "large whites" or about 75 cents or $1 per thousand for "small grays." For the rest or last half of the second season (October 15 to May), the trade is supplied from the hibernating specimens which have been reared on the snail farms. Prices are now a little lower for "large whites," which bring only from $1.75 to $2 per thousand; but the price of "small grays" remains about $1 per thousand.

PREPARATION FOR THE TABLE.

In the United States the popular idea seems to be that all French people eat snails quite often, but such is far from being the case, for the French regard the snail in much the same light as we Americans do the oyster, and, in fact, it is just as nutritious, containing, as it does, about 17 per cent nitrogenous matter. It is not a national dish, however,
but a national delicacy—one to be partaken of perhaps as an entrée at 30 or 40 cents the plate when one goes to dine at some smart café—one to be washed down with wine while the orchestra plays softly. A luxury, a "tidbit," if you wish, but scarcely a staple, and never to be mentioned in the same breath as beefsteak and onions.

At one of the best Parisian restaurants where snails are made a specialty the daily consumption often totals 5,000 of the best "large whites," and at numbers of the less select places as many as 10,000 or 12,000 of the cheaper grades are eaten during the 24 hours. However, there is as great a range in price as in the flavor of the snails, so if 30 cents per plate seems a trifle extravagant, one may go to a pushcart on the street and buy them raw for 6 or 7 cents a dozen, and they may be prepared at home in any one of the many appetizing ways so much in vogue with the French chefs.

In Burgundy most of the snails are cooked before being sent to market, so when the demand for the mollusks begins in the autumn the grower goes to his warehouse and the trays of dormant snails are taken down. Women next examine each animal, rejecting the dead ones and removing the epiphragms from the living. Next the shells are brushed to remove any dirt and then placed in flowing water, where they are stirred around by a man with a spade until thoroughly clean.

During this time a large caldron of salt water has been prepared, and in this about 10,000 snails are boiled at a time. The meat is now removed, reduced to a paste, seasoned with finely chopped parsley, chervil, and shallots, and placed between two thin slices of unsalted butter. Meanwhile the shells have been cleaned and dried, and with this mixture they are now stuffed, and the "Burgundy snails" are ready to be shipped off to the private consumer in wooden boxes and baskets of 50, 100, and 200, or to the shops and restaurants in lots of from 500 to a couple of thousand or more.

Another favorite receipt, very similar to the last, is as follows: First the snails are boiled in the shell for 5 minutes, after which they are extracted and thoroughly cleaned. Then they are boiled for 2 hours or more until thoroughly tender. They may now be left in this state, or, if desired, may
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be thoroughly minced. Make a paste of butter, a considerable quantity of good olive oil, chopped parsley to taste, and a small quantity of finely minced eschalot. Thoroughly cleanse the shells by boiling and scrubbing until nearly white, and then stuff these with the prepared snail meat, closing the aperture with a plug of the butter paste above referred to. In this condition they can be kept for some time, if refrigerated, and all that remains to be done before serving is to heat them for about 5 minutes over a hot fire, which literally broils the meat in the butter paste. The shells are served upon a silver platter and the edible part picked out with a two-pronged fork. Thus served, snails make a delectable entrée, especially if a light wine accompanies the course.

Another favorite dish is escargots (snails) à la Bordelaise; simply a combination of the cooked snail meats, garlic, butter, and red wine. For those who find the above too rich, a body of toasted crackers or bread crumbs can be added, and the whole baked together, using just enough butter and wine to bring about the right consistency.

During recent years the great demand for snails has led to a number of imitations, and many are the deceptions practiced. For instance, the snail grower picks up and cleans all the old shells which have accumulated during the summer. These he sends to Paris, where they bring about 25 cents per thousand at cheap restaurants, etc., where they are stuffed with a mixture of a little snail flesh, lots of liver, some butter, and plenty of herbs to disguise the mixture. The result is sold for "genuine Burgundy snails."

PRESENT STATUS OF THE INDUSTRY.

Even though the market for snails is still so great in Europe, snail gathering and snail farming do not seem to be at all profitable over there, and in many localities where they were formerly abundant the mollusks can no longer be obtained, even many eminent French authorities admitting that "snails as an edible commodity trade a good deal on their ancient fame." Only a short time ago one of the most widely read agricultural papers of France was asked if the rearing of edible snails was economically possible, and the answer was, "We respond without hesitation, no."
POSSIBILITIES OF THE INDUSTRY IN THE UNITED STATES.

In the United States snails are often stocked by the fish markets of our larger cities, where they have a limited sale among the foreigners, but comparatively few native-born Americans have ever tasted them, know of their preparation as food, or even consider them as a fit article of diet. Those sold in our markets are practically all imported from France, but such should not be the case, as they are an excellent and tasty article of diet, are very easy of culture, and should, therefore, be grown over large sections of our country where they are now unknown.

Almost everyone who has ever eaten well-prepared snails admits their gastronomic worth, both from the point of nutritive value and that of flavor, and there are many States where they could be grown and kept fresh until used where they would prove a very welcome addition to the somewhat limited menu of the locality. In the Mississippi Valley, for instance, where conditions for their cultivation are almost ideal, they could be grown at practically no cost (either in money, time, or labor) and might be used to a great extent in place of oysters, which they greatly resemble in flavor when properly prepared. Such a practice would be greatly advantageous, for the snail is really preferable as an article of human consumption, as it is cleaner, feeding daintily, as it does, only on the cleanest of vegetable tissues, while oysters, not being able to move about in search of food, must take what comes to them in the water, are sometimes fattened in water impregnated with bacteria-laden sewage, and thus act as carriers of typhoid and other diseases.

For economic reasons a thorough trial should be given these mollusks, since, as stated above, there are many sections where, if once introduced, they could be left to their own devices and gathered as needed for home consumption or for the market. Not even a fence is needed for their confinement, as they do not stray far from the point of liberation if conditions there are favorable to their development. Thus not only a new food might be added to the American table, but the income derived from the sale of snails might reach a considerable figure in the aggregate.
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CONCLUSION.

Conditions on this side the Atlantic are so different from those encountered in Europe that where snail culture there may not be markedly profitable it might be made so here. There people depend for their livelihood on the growing of snails, which must be watched, tended, and reared on a small patch of ground; their food must be grown and supplied them regularly, and everything done with much labor, while here in the United States, where we have much unoccupied land, the snails may be turned loose on a limestone bluff, which is good for nothing else, and the profits reaped. If the snails multiply sparingly, the profits would consist only in the added variety to the grower's menu, but if production were on a larger scale, the surplus could be sold when a market had been created by a little judicious publicity, and the profits taken in hard cash. But be the profits great or small at first, a really worthy article of diet would have been introduced, and an industry created which might reach large proportions if the American people could only be educated to see the true worth of the edible snail.