ple little instrument and easy of manipulation. A small mirror is set on a tripod in such a manner that the rays of the sun reflected from its surface may be thrown in any direction and kept at the point desired by mechanism compensating for the rotation of the earth on its axis. These rays, interrupted so as to show flashes of long or short duration, representing the ordinary Morse alphabet, are watched and their variations noted at the distant station.—*Boston Transcript*.

THE WARRIORS OF BRITISH NEW GUINEA.

By Lieut. B. BADEN-POWELL, Scots Guards.

OF all the countries in the world, or certainly of all English colonies, probably the least known is New Guinea. Thirty years ago the very coast line was unknown; the exact shape was only made out fifteen years

WARRIORS OF NEW GUINEA.

ago. But now civilization is steadily spreading to its shores, white men are established in the land, and the British government has its officials permanently located. But even now we know but very little of the interior, and there are but two or three ports on the coast where a white man would care to land unarmed. One of the chief causes of this backwardness of so large and promising a land is the treacherous hostility displayed by the natives.

Already a large number of Europeans have met with their deaths at the hands of the natives along the coast, and, while hoping for the best, we cannot be blind to the probability that more white men will have to lay down their lives before these savages have been sufficiently taught that murder is with us considered a

A MAN CATCHER.

crime. There are many different reasons given by natives for their attacks on intruders—coveting their possessions, alarmed at their intentions, mistaking their meaning, or simply, as is sometimes the case, for the sake of killing a man and keeping his head as a trophy. Besides, there may or may not be cannibalism; but it is certain that with some tribes, at least, only the bodies of enemies killed in action are eaten, and some (if not all) will not touch white man's flesh. Under these conditions troubles between races are sure to occur, and British magistrates and British forces will be called upon to punish murderers and would-be murderers, and to interfere in quarrels between local tribes. It thus becomes a necessary as well as interesting study

STONE CLUBS AND DAGGER.

A BARBED SPEAR.

to inquire into their means of offense and defense, and I write from recent personal experience in New Guinea itself.

We need not allude to anything in the way of a large rising—a civil war—since it is very unlikely that anything of the kind would take place in New Guinea, chiefly because the population consists of so many different tribes, each distinct from the other, with totally different language, manners, and customs. A native of one part of New Guinea would be as much a stranger in another part as an Englishman would. It is, therefore, probable that the only kind of warfare which will be carried on between ourselves and the natives will be of a minor kind, merely punitive expeditions, which need not expect any great amount of opposition from the natives themselves, but which, nevertheless, must expect to encounter great difficulties

from the deficiency of means of progress and communication, and from being continually open to small and sudden attacks.

One of the most noticeable characteristics of the warriors of New Guinea is their treacherous mode of attack. One may enter a village and be welcomed by a crowd of unarmed men, who will show every sign of friendship; but once they see their opportunity—once the party is dispersed, arms laid down, or some asleep—then in a second the natives are around and rush to the attack. Extreme vigilance must at all times be observed. Then, again, while marching along the tracks through the bush country, natives will readily mark the approach of the Europeans. They will watch their opportunity again; keep some distance ahead of the advancing troops, or move along parallel tracks in the scrub, and make the most of any opportunity of sudden attack, such as during a halt or when the party has become somewhat dispersed. The general method of attack in most parts of New Guinea seems to be that of charging up toward the enemy, and, when within, say, 20 to 30 yards, throwing their long spears. Some of them are wonderfully good shots, and can send their spears through a dog running away 30 yards from them. But spears are not the only arms. In the west of British New Guinea bows and arrows are much used, and are, of course, far more formidable than the spears, as their range is much greater, and the aim much more accurate; the natives practice by shooting at cocoa nuts in the trees. It is probable that neither spears nor arrows are ever poisoned in New Guinea. Another primitive weapon of offense which is sometimes used, especially at the east end, is the sling. A few stones are carried, often nearly as big as one's fist, and these are hurled with a twist of the arm very similar to the action of ordinary throwing (without twirling the sling round over the head as is done elsewhere). The natives seem to vary a great deal in their ability to sling stones, some being marvelously good both in accuracy of aim and in great distance, perhaps 200 to 300 yards; while, on the other hand, many others are very feeble in their efforts. The natives of certain districts possess a most curious instrument, used more for the capture and slaughter of an already vanquished foe than for actual attack. It consists of a stick three feet long, on the end of which is a piece of cane bent round like the iron of a landing net, and of such a size as to easily slip over a man's head. On the end of the stick is fixed a sharp stake, the point of which comes nearly to the center of the cane ring. In chasing a fleeing enemy, the warrior holds out his "man catcher" and puts the cane ring over the unfortunate fugitive's head, when a sudden pull back causes the latter to stop short and fall backward upon the sharp stake, which runs into his neck just at the base of the skull, and he is instantly killed. The only other weapons used are clubs, these being of several varieties. The stone-headed clubs have pieces of beautifully worked stone fixed on the end, either made sharp so as to cut like a hatchet, or carved into a series of spikes. Other clubs are made of heavy hardwood, often made of the shape of a two-edged sword, and are consequently comparatively sharp, and have a certain amount of cutting power.

Some natives use a blowpipe for shooting birds, but it is probably but seldom used as a military weapon. Most of the natives have shields. These are generally of wood, about three feet high by one and a half to two feet wide. They would, of course, be useless against fire arms.

Although the natives of New Guinea are not given, as a rule, to do much in the way of fortifying their villages, yet some of these have been found with a large palisade around them, consisting of saplings firmly planted in the ground two or three inches apart, and secured by a cross bar eight or ten feet above the ground. Entrances are left in this palisade which may be closed by horizontal bars.

One of the many curiosities to be met with in New Guinea are the tree houses. They are used as lookouts, towers, and also for defense. Many villages have a house built in one of the biggest trees in the village, connected by a ladder with the ground. On the approach of an enemy, the inhabitants retire to this refuge, and are then not only out of harm's way—being above the range of a spear—but also spears and stones, of which a store is kept, can be hurled down upon their enemies from above. These tree houses are used around the palisades above described, as galleries to protect them.

The natives, as a rule, are wonderfully quick at distributing news. There are many means of signaling and making known various facts. The tom-tom is a favorite instrument, as in all uncivilized places. Generally it is played when the men are assembling for a warlike purpose, but not always. It is occasionally used on other occasions. Trumpeting on large shells has a more significant meaning. On the approach of danger, the weird sounds of these horns can be heard for miles around as they are taken up from village to village. Another elaborate system of signaling is by watch fires. Sometimes these are lighted in rows of two or three, and many of the hills have their beacons alight at night. Even the smoke in daytime is said to convey its meaning to those on the lookout.

The means of progress in a country is always one of the most important considerations from a military point of view, and is a most difficult one in New Guinea, where not only are there no roads, but no vehicles or horses, with the exception, of course, of a very few in the immediate neighborhood of the white settlements.

In so large a country, of course, every variety of natural feature may be met with; New Guinea generally may be described as hilly and covered with scrub. All the more thickly populated districts are covered with a network of native tracks, worn or cut through the bush, and of such a width as to allow one at a time to pass. Occasionally the bed of a stream is taken advantage of, which in the wet season necessitates wading; all very well for the bare-legged natives, but to the European most productive of fever, which, as is well known, is most prevalent in all parts of New Guinea. Not only do nearly all Europeans who travel there get attacked sooner or later, but South Sea Islanders, and other blacks imported for labor, seem to fall a prey to it even more quickly. We need not here discuss the causes and treatment of the disease; it is one which doctors do not well understand, and the only real cure seems to be to leave the country.

The climate is, as a rule, tolerably agreeable—hot, of

course, but not unpleasantly so, and nights are generally cool. Rain falls in showers pretty frequently at most times of the year, though the rainy season is supposed to be more particularly from December to May. One can generally count on sleeping out at night, though it may be just a bit fresh in early morning and a covering desirable, and one must always be prepared for short damping showers.

Having thus considered the natives and the nature of the country, we may draw some conclusions as to the conduct and organization of a force sent to the country on a warlike mission.

First, we see that the numbers need not be great. A party of a dozen well armed men could go in safety anywhere. But as the object of the expedition would often necessitate a thorough examination of the country, a number of small parties would probably be

TREE HOUSES IN A NEW GUINEA VILLAGE.

the more suitable formation. But then again there are great difficulties about transport. The natives are not given to doing much work, and, as previously explained, most of them would disappear before an invading force. Carriers would have to be specially attached. These might be either natives from other parts of the country (although often very timid of entering strange territory) or from the neighboring South Sea Islands or elsewhere. It would be unadvisable, in so hot and unhealthy a climate, to load Europeans too heavily; and yet too much reliance must not be placed on natives. The best organization would be several small columns, each consisting of an officer or two, a few steady Europeans, and a party of native carriers (women being often the best porters). Probably a few horses could be imported, which would greatly aid the transport. The force, acting in such small parties, and in such difficult country, would necessarily have to be well disciplined to be kept in hand at all. Each man should be thoroughly reliable, certain to keep his watch faithfully at night, able to take care of himself if separated, using tact with the native carriers, etc.

As most probably fighting would be sharp and sudden and at close quarters, a magazine rifle would be best; long range would seldom be necessary, and the natives would not be likely to do much in the way of fortifying themselves, except by getting into their tree houses, which are easily pierced by bullets. A few mounted men in small parties might be very valuable for rapidly driving the natives away and hunting them down, although, of course, as a rule, their progress would be much impeded in the narrow tracks. Means of communicating between the different bodies of the force would be most necessary; and whistles, heliographs, flags, signal lamps, and rockets should be taken.

The operations would in all probability be near the coast or up some large river, so that steam launches and boats would be sure to form an important aid in

AN ARMY ON THE MARCH.

transport, as well as for patrolling and chasing native canoes.

It may be as well to briefly refer to the geographical position of the country. Roughly speaking, the known portion of British New Guinea consists of a strip of coast land some 800 miles long. Port Moresby, the capital and seat of government (although a very primitive place), is about half way along, and possesses a fine harbor. At the extreme east end is a small island, Samarai, where there is good anchorage and some stores with a supply of coal. At the west end there is no port or occupied place; but it is easily reached from Thursday Island in Queensland, where all supplies are obtainable. Several islands, on which settlers or missionaries are established, might form convenient bases, and there are several good, though little explored, harbors.

All kinds of supplies could be sent up from Brisbane or Sydney to any portion of the colony in a week. Here also a well organized force could be raised from the local troops, many of whom are good bushmen and accustomed to hard work in the tropics. But let us hope that their services will not be required, and that New Guinea will peaceably settle down into an orderly and prosperous colony.—*Ill. Nav. and Mil. Mag.*

GOLDIE'S BIRTHWORT.

Aristolochia Goldieana.

HAVING announced the flowering of this interesting plant recently in the Royal Gardens, Kew, we have thought it advisable to again bring it under the notice of our readers, because it happens to be one of the few gigantic beauties that may be grown in any garden where the warmth of a stove is at command. The aristolochias are not in any special degree popular, and the "giants" of the vegetable kingdom are not in favor as subjects suited for cultivation in gardens generally. We should not, for example, recommend the titanic *amorphophallus*, or the *rafflesia* or *welwitschia* for addition to any amateur's choice collection, but the plant before us may be grown in a ten-inch pot, and will flower sufficiently often to pay for the attention it requires, and, all things considered, it might be pronounced a quite "proper" plant for a stove of moderate dimensions, wherein room can be found for a few curiosities of more than average interest. As the

in stemming the flood of foreign importations, and thus benefit the hard working British growers.

I am a grower of mushrooms for market on a moderate scale, and have no reason to complain of want of success hitherto in a pecuniary point of view. I have no properly constructed houses, but grow the mushrooms on the floors of unheated sheds in summer, and in the paths of my glasshouses all the year round, and the following includes my *modus operandi*.

Preparation of Manure.—This I procure in large quantities at a time, or say I have four empty beds that I wish made up, I procure the manure for these all at one time, and just as it is thrown from the stables. This I throw into a heap in the open air, without removing a single straw, no matter how rough and strawy the mass may be. This heap I turn, on an average, three times a week, and it is exposed during the time to all weathers. If the heap be very rough and strawy, it will be sure to heat dry and white, especially if no rain falls during the process of turning and "making." In this case I add water freely during the act of turning, which assists in the making. During high winds the process of heating is retarded, and when this occurs I tread the heap hard down, and shelter the weather side with boarding, which I have always at hand. The process of making, if the dung is long, generally occupies about four weeks; if shorter, about three. When the dung, from the effects of turning and watering, becomes moderately short, brown-colored, hot, and moist, but not wet, it is ready to be put into the beds.

But rather than go to the expense of bringing fresh loam from great distances, I would prefer to use ordinary garden soil.

Watering.—This, I often think, is the most important point in mushroom growing, especially under glass roofs, and where there is no foliage above to protect the beds from the rays of the sun. When I first began mushroom growing in the paths of my houses, this question of watering puzzled me greatly. My beds were continually getting dry, and I kept as continually watering them. I felt that all this was wrong; so, until I could think out a better plan, I covered my beds with a thin coating of clean straw all over, which answered fairly well, the straw preventing such rapid evaporation as took place before. There was, however, this to be said against it: first, that one could not see when the mushrooms made their first appearance on a newly formed bed, which we are anxious to do; secondly, when the mushrooms had to be gathered, there was always a great deal of trouble attached to the removal and replacement of the straw; and, thirdly, the straw proved to be an undoubted shelter for woodlice and slugs. After a little thought, I hit upon a plan which I at once adopted, and have had working for some years with very satisfactory results. I shall here attempt to describe it. The paths of the houses are, of course, excavated to the depth required for the reception of the dung, and lined on each side with brick walls, one brick thick. Fixed into these, at intervals of 6 feet, are crossbeams, 3 inches by 3 inches, and on the top of these, in the middle of the bed, and nailed to the cross pieces, runs a thick plank that will not spring. This is used as a gangway, or place to walk and wheel on. Lengths of wood of the same dimensions as the cross pieces are fixed on the top of the walls, running the whole length of the bed. On these are hinged shutters, made of wood, an inch in thickness, on each side of the gangway, and 6 feet long, or so that each shutter will catch on the cross-bars for support when down, and so wide as to fit closely to the gangway, and the arrangement is complete.

For examination of the bed, watering, weeding, and gathering crop, all that is required is to raise a shutter where you please—by the way, they are all fitted with wooden handles, firmly secured—and set it back. It then stands upright, having for support the greater part of the thickness of the wall plate. When the examination is over, the shutters are gently laid back in their places, and all is darkness and comfort underneath.

This arrangement is a little expensive at first, but that is soon covered by the saving of labor and the greater comfort in working the beds. With this arrangement the workpeople can walk on the gangway and shutters over the whole surface of the beds in prosecuting the work of training vines or tomatoes as the case may be; whereas, with only a single plank running up the middle, slips of the feet were constantly occurring, much to the detriment of the mushrooms underneath.

After spawning and moulding, the beds are allowed, of course, to remain without water till nearly the end of the sixth week, when they receive a gentle sprinkling of tepid water daily till the moisture reaches the manure, after which the mushrooms soon appear. When this takes place, the boarding on top of the beds is kept wetted by the syringe three or four times a day, according to the weather, which has a wonderful effect in keeping the beds below in a uniform state of moisture.

I may mention that when I began to grow mushrooms first in my glasshouses, I had the bottoms of the beds concreted, but partial and sometimes total failure was the result. Judging the cause, I had the concrete removed, with good crops as a result.

In conclusion, I may state that my average yield of mushrooms per square foot of bed is about 1½ lb., which yields a satisfactory profit.—*Market Gardener.*

THE MEDICINAL USES OF LEAVES.

By P. L. SIMMONDS, F.L.S.

It is strange how assiduous and successful both civilized and savage man have been in utilizing for some economic purpose every portion of various plants. Roots, stems, barks, saps, and exudations, leaves, flowers, fruit, and seeds are alike applied to some useful employment; especially has this been the case in pharmacy and medicine. To take one branch of vegetation, the foliage of plants, what a curious investigation for study does it offer in the form, color, texture, and qualities of various leaves, and the employment of some for food, for dyeing and tanning, for textile manufacturing and other economic applications, and for their medicinal properties. It is the last division I propose to consider here. Through the vulgar error of undervaluing what is common, we are apt to pass leaves by as of little worth. A close scrutiny and careful examination would convince us of the economic importance of these foliose organs. Their dietetic uses are alone of great importance, if we consider merely culinary vegetables, tea, and tobacco.

In glancing through various botanical and medical works, I have jotted down the various leaves which have a medicinal or healing reputation, and the list becomes an extensive one. Not that all these have any established reputation, for only a small number are included or recognized in the various national pharmacopœias, but their employment points to some generally conceived opinion as to their useful properties.

I have not thought it necessary to arrange these under their genera and families, but merely note them as described, under the belief that some among them may be found worthy of closer attention.

The leaves of *Asteracantha longifolia* are used in India as a diuretic.

The foliage of the *Eucalypts* of Australia, especially *E. amygdalina*, *citriodora*, *globulus* and others, yields a large supply of an antiseptic volatile oil of excellent, lemon-like fragrance. Cigars made of the leaves have been recommended in asthma.

The leaves of *Pilocarpus Pinnatifolius* are famed as an agreeable, powerful, and quickly acting sudorific, and also recommended as a specific in diphtheria, as well as in typhoid fever.

The foliage of *Leonotis Leonorus* has some therapeutic properties; the leaves when used like tobacco are highly sternutative.

Matico, the dried leaves of *Artanthe elongata*, serves

GOLDIE'S BIRTHWORT—ARISTOLOCHIA GOLDIEANA.

flowers of this plant are exquisitely beautiful—far beyond the suggestion of the best figures that have appeared—and measure over a foot in diameter at the margin of the limb, it must certainly be entered in the list of "wonderful" things that one can afford to wait for a reasonable length of time, and will not soon forget when the gratification has been secured of a display of its floral capabilities. The plant so admirably flowered by Mr. Watson at Kew might, as we remarked at the time, have been crumpled up into a man's hand, although the flower must rank with the largest that nature produces.—*The Gardeners' Magazine.*

MUSHROOM CULTURE.

THERE has been lately a good deal of discussion in the pages of the gardening press on the interesting subject of mushroom growing, and as the opinions therein expressed are somewhat diversified and conflicting, I am induced to offer a few remarks with reference to my own actual experience.

I altogether waive the scientific part of the subject. I will leave that to others, preferring to stick to the practical part, as one best calculated to be of tangible benefit to growers in general. I give the following account of my procedure, with the one simple object of perchance being of some little help to those who may possibly have sometimes failed in their attempts to produce paying crops of this much coveted esculent, believing as I do that a free circulation of opinion and more especially of actual experience and results among English growers, not only on the subject of mushrooms, but on all other matters connected with the market produce of garden and glasshouse, would at least assist

Making up the Beds.—These I fill up to a depth of 12 inches with the prepared dung. The mass is well shaken up as it is brought into the house, and as evenly laid down as possible, and is then at once trodden down firm; the depth of dung, when hard trodden down, will usually be about 9 inches. I consider this quite enough, and any more merely a waste of manure. I can remember once running rather short of dung, and forming a bed that, when trodden down, was not more than 6 inches thick, and it did quite as well as the thicker ones put down at the same time.

Spawning.—My rule is to insert the spawn the moment I find the heat is not on the rise, which I find out by the thermometer, but I do not hesitate to spawn in a good strong heat, believing that to be much better than to allow the beds to fall to anything like a low degree of temperature. I use the spawn in goodly pieces, and at the rate of about 1 bushel to 50 square feet. These pieces are tucked in, as it were, under the dung with the aid of pointed pieces of iron three-fourths inch in diameter and about a foot long. With such instruments the work of spawning can be got through very rapidly.

Soiling the Beds.—This work I perform the moment the beds are spawned, putting on a layer of about two inches in thickness when rammed down, which is done at once. I use fresh loam when I can get it, but when not procurable I use ordinary garden mould, and after an experience extending over some years, I must confess that so far as regards the quantity of mushrooms produced, the one kind of soil seems to be quite as efficacious as the other. The only advantage maiden mould has over ordinary garden soil is that it produces fewer weeds, which of course is a consideration.