Campaign of 1845-46, after which he was appointed medical officer, and subsequently Political Assistant to the Resident in Nepal. While holding that post he died of cholera at Dinapore on 13th November 1849.

Hugh Francis Clarke Cleghorn entered the Madras Medical Service in 1842. He served in the Mysore Commission for some years, was on furlough from 1848 to 1851, and on his return became Professor of Botany and Materia Medica in the Madras Medical College. In 1855 he became Conservator of Forests in Madras, a post which he held till 1867, when he was appointed to officiate as Inspector-General of the Forest Department. He retired in 1869.

Charles Hathaway entered the Bengal Army on 10th August 1843, became Surgeon on 27th June 1857, and Surgeon-Major on 10th August 1863. He was for many years Civil Surgeon of Lahore, and subsequently Inspector-General of Gaols in the Punjab; but was best known as Private Secretary to Lord Lawrence, during his tenure of the office of Governor-General. He retired 14th February 1866, and is still alive, nearly forty years later.

Arthur Young entered the Bengal Service on 20th October 1853, becoming Surgeon on 4th October 1864. He served in the Oudh Commission till his retirement on 26th March 1872, and is still alive.

John Lindsay Stewart became Assistant-Surgeon, Bengal, on 4th August 1855, and Surgeon on 4th August 1867. He served in the Mutiny, being present at the siege of Delhi. In 1860-61 he officiated for Dr. Jameson as Superintendent of the Saharanpur Botanical Gardens, and in 1864 was appointed Conservator of Forests in the Punjab; a post which he held, with an interval on furlough in 1869-71, till his death, which took place at Dalhousie on 5th July 1873.

William Henry Hayes also entered on 4th August 1855, and became Surgeon on 4th August 1867. After twenty years' service in the Bengal Commission, chiefly in the Sinhbhum District, he retired on 16th April 1878, and is still alive.

Henry Walter Bellew, after serving in the Crimea, entered the Bengal Medical Service on 14th November 1855, and soon made a name for himself as an authority on the language, manners, and customs, of the Afghans, and as a traveller. During the Mutiny he was with the Lumsdens at Kandahar; in 1871 he accompanied Sir R. Pollock's Mission to Seistan, and in 1873 went with Sir Douglas Forsyth to Kashgar and Yarkand. He was made a C.S.I. in 1873. In 1879-80 he served in the Afghan War as Chief Political Officer at Kabul, but had to return home on account of ill health. The last appointment he held in India was that of Sanitary Commissioner of the Punjab. He retired on 14th November 1886, and died on 26th July 1892.

As we have now, in our survey, come down almost to the present day, a brief notice will suffice for those officers who have served in political employ at a later date. *J. P. Stratton*, of the Bombay Medical Service, spent most of his service in the Political Department, and was for many years Resident at Jaipur. *Sir Alfred Lethbridge*, after nearly twenty years as Inspector-General of Jails, Bengal, became Superintendent of the Thagi and Dakaiti Department, from April 1892 till his retirement on 1st April 1898. *Oliver Thomas Duke*, after serving as medical officer to the Beluchistan Political Agency for some years, became a Political Agent in the same Province. Since his retirement on 22nd February 1887, he has thrice unsuccessfully contested South Bedfordshire in the Unionist interest. *Sir George Robertson*, the explorer of Kafiristan and defender of Chitral, retired so recently as 22nd October 1899, and in 1900 unsuccessfully contested Stirlingshire as a Radical.

A few lines may be devoted to mentioning some medical officers not in the I. M. S., who have won distinction during the last half century as diplomatists or administrators. Sir John Kirke was Consul-General at Zanzibar; Sir Rutherford Alcock was Consul-General in Japan from 1858 to 1862, and Minister Plenipotentiary at Pekin from 1865 to 1871. Sir Samuel Rowe, of the Army Medical Department, was Governor successively of the Gambia, of the West African Settlements, and of the Gold Coast and Lagos. Sir William MacGregor, first a Colonial Surgeon, subsequently Administrator of British New Guinea, Governor of Fiji, and Governor of Lagos. Leander Starr Jameson is best known as the leader of the famous raid on Johannesburg.

Last, but not least, we may allude to Leonard Wood, Assistant-Surgeon in the United States Army, who, in the late Spanish-American War, developed into a Brigadier-General, and subsequently became Governor-General of Cuba. An incident in his career goes to show that red tape may flourish as rigorously under the "Bird O' Freedom Soarin" of young America, as under the effete old British Lion. While Wood was Governor-General of Cuba some official discovered that he had never passed the examination for promotion from Assistant Surgeon to Surgeon, and gravely proposed that he should be recalled to the States for the purpose.

RESISTING POWERS OF THE LARVÆ OF CULICIDÆ TO DESICCATION.

BY E. JENNINGS,

MAJOR, I.M.S.,

Bareilly.

IN April, 1901, I took up the subject as to how mosquitoes, especially culex, (as I am glad to say anopheles are scarce here,) tide over the different seasonal periods inimical to their breeding. I started with eggs, and carried out innumerable experiments in order to see if eggs

removed from water could be placed in such surroundings, that after a time on being replaced in water they would hatch out. I found after all my experiments that eggs removed from water for 24 or 36 hours in no case hatched out. This has led me to believe that the different periods are not tided over by eggs. One of my experiments was to place eggs on dry mud taken from a small tank. The mud was put in a small glass vessel, the eggs placed on the mud, and water was then poured into the glass vessel. After two hours I found on looking into the water four or five larvæ. Although the eggs did not hatch, this at the time did not strike me as being important, since I thought these larvæ seen were in the water which I had taken from a tub in my bathroom.

At the end of April I went home on leave, and so did not carry on any more experiments, although I had satisfied myself that eggs must be put out of court. On returning in July this year I made several experiments with larvæ, which I need not repeat here as they were failures. On reading through my notes I came across the remark that "there were four or five larvæ in glass vessel which contained tank mud on which eggs had been placed." This struck me as being worth while to repeat, but with certain precautions, *viz.*, to use filtered water. In my garden is a small shallow brick tank, the size being 2′ × 2′ × 6″ The tank is in the sun. I examined it and found a certain amount of mud and dead leaves at the bottom. There was about one inch of water, and it swarmed with larvæ of culex of various ages, also nymphæ and eggs. This was on the 18th of August. On the 21st the tank was dry and the mud quite dry. I scraped up the whole of this mud and put it into a box. On the 21st I put some of this dry mud into a small glass vase along with filtered water. Two hours after I found two larvæ. Some of this mud I put into water every day till September 3rd, when I put it in every other day till the 23rd of September, with the results given in the Table below. On the 28th August, 1st September and 21st September the results were *nil*. This may have been due to no larvæ being in the mud, or to their having died; anyhow it made no difference, as on subsequent days larvæ appeared. A month after, *viz.*, 23rd October, I again put some of the dry mud into water, and found larvæ in the water six hours after. The water being much colder in October, hence the delay in the larvæ being resuscitated. The last of this mud I placed in water on November 16th, and found two larvæ after seven hours. I have some other mud which has now been two months perfectly dry, and which gives me good results on being placed in water. From this mud I shall continue the experiment. I am certain that if, after complete desiccation, larvæ can be resuscitated after nearly three months, then they will come to life after a much longer period. On referring to the Table, it will be seen that only those larvæ of about two to three days old survive. I have never found any older or any nymphæ, although the water contained larvæ of all ages, also nymphæ and eggs.

In these experiments, it may be said, that the eggs, which were also present, hatched out.

I do not think so for the following reasons:—

1st—Experiments carried out in April 1901 on eggs gave no results.

2nd—I could find no eggs in the mud after being placed in water.

3rd—The size of larvæ were much too large for newly hatched larvæ.

4th The short time in which larvæ appeared in the water.

Everything points to the fact that the larvæ present were not recently hatched. All larvæ ran their usual course and became mosquitoes, as will be seen on referring to Table. On referring to Giles' excellent book on Gnats and Mosquitoes, second edition, page 123, the following will be found:—"Desiccation, on the other hand, was better borne by the nymphæ, which in a few days were transformed into very active mosquitoes, in spite of being placed in dry river sands, so that a drying up of a pool does not stop the development of such insects as have reached this stage, while the larvæ were all dead in two days if dried at 20C., and both stages were killed by two minutes' exposure to a temperature of 40C. Experimenting in India I found that larvæ were usually dead and decomposed before the mud of the pool in which they had lived had dried up by ordinary evaporation."

In my experiments I found that all larvæ over three days old or thereabouts did not revive—in fact all my first experiments ended in failure, as I had experimented on larvæ of six, seven or eight days old. I also find that they do not survive in mud taken from every tank. I am now experimenting as to the conditions, *i.e.*, to ascertain if the water has to be rapidly evaporated in the sun, or out of the sun. Time of year:—The experiment in 1901 was in April before the rains, and the one in August after the rains. Season may have something to do with it. No nymphæ have ever survived in my experiments; but in future experiments they may prove to do so. The facts which I have up to date verified are:—That Culex larvæ of a certain age can survive after nearly three months' complete desiccation. No nymphæ or eggs have survived after desiccation. The larvæ that have been resuscitated run the usual course and become mosquitoes. If this is true for culex, I am almost sure that the same will hold good for anopheles, in fact, in one of my experiments on anopheles larvæ I believe that they did survive. The experiment was not completed, as an accident happened to the glass vessel, a rat having knocked it over.

I have not been able to carry out any more experiments with anopheles because, with the

exception of one small puddle under a tree which contained anopheles, I have not been able to find any larvæ for some distance around, but I hope that those more unfortunate who have pools with anopheles in them might repeat my experiment. I hope later to send you a method by which, if I may use the phrase, larvæ can by artificial means be desiccated. I am now working on this. I find that a shallow brick tank with the usual mud and leaves at the bottom, the tank being in the sun, is the best place to take the mud from. The mud when quite dry is scraped up and put into a card-board box. A small glass vase in which water has been placed is best. I take some of the dry mud and drop it on the water, this floats at first and then gradually drops to the bottom; from two to eight hours after, according to the temperature of the water, the larvæ can be seen swimming about. I find at Bareilly that tanks and certain shallow puddles contain water up to the beginning of April, during which time culex can be found. Larvæ, nymphæ and eggs are to be found in these tanks and puddles, but from April to the middle of June, or till the rains break, mosquitoes are not seen. There are no tanks or puddles, water being taken from wells. It is this period which mosquitoes have to tide over. In my experiment on eggs in April 1901 I found larvæ in the mud, though this is open to doubt, *viz.*, that they may have been introduced into the glass vessel from water taken from my tub, but from recent experiments I believe myself they were in the dry mud. My experiments, as far as I am aware, were carefully carried out, and errors guarded against; so it can be taken that larvæ of culex can survive three months' complete desiccation. This would easily tide over the period of April, May, and June in Bareilly, when water on the surface is very scarce, and I have no doubt that the period of desiccation can be considerably prolonged and the larvæ survive.

I believe this is the only method by which culex tide over periods inimical to their breeding. I have kept mosquitoes, and have tried various methods to prolong their lives; but 20 to 30 days is the longest I have been able to keep them alive, without food or water eight days. Now during the hot weather, at least in Bareilly, *viz.*, April, May and June, a mosquito is very rare, in fact I have not seen one. If they are present, what do they live on? Green vegetation is scarce, at least what one would expect a mosquito to eat. How can they then survive the three months in which water and food, I might say, are absent? I am still working at experiments to find if it is possible to keep a mosquito alive without food or water. I find if kept in the dark, they live longer than if exposed to light. It may be that mosquitoes breed in April, may have the power of hibernating, and doing without food or water; if not, I do not see how they can survive, especially in the Punjaub, where food, except animal, is more scarce than in the Upper Provinces. If they prolonged their lives on animal food, why are they not seen and felt? Eight days is the longest period I have been able to keep a mosquito alive without food or water. Under favourable conditions, from twenty to thirty days. In Bareilly I have found culex in all months except April, May and June, and it is during these months, when food for the mosquitoes, and water for eggs, larvæ, and nymphæ is absent, that the power of the larvæ of a certain age to survive dessication enables them to tide over the period during which they would become extinct.

Table giving date in which dry mud was put into water, with number of hours after which larvæ appeared, their apparent age; date on which nymphæ and mosquito appeared.

Month and date.	Hours after mud was put in water that Larvæ appeared.	Age of larvæ about	Date on which nymphæ appeared.	Date on which mosquitoes appeared.
21-8-03	Two ..	2 to 3 days	25-8-03	27-8-03
22-8-03	Four ..	2 to 3 ,,	26-8-03	28-8-03
23-8-03	Two ..	2 to 3 ,,	27-8-03	28-8-03
24-8-03	Four ..	2 to 3 ,,	28, 29-8-03	29, 30-8-03
25-8-03	Three ..	2 to 3 ,,	29, 30-8-03	30, 31-8-03
26-8-03	Five ..	2 to 3 ,,	30, 31-8-03 1-8-03	31-8-03 and 1,3-9-03
27-8-03	Six ..	1 to 2 ,,	31-8-03 and 1-9-03	1,2,3,-9-03
28-8-03	*Nil* ..	*Nil*	*Nil*	*Nil*
29-8-03	Two ..	1 to 3 ,,	1, 2-9-03	2, 3, 4-9-03
30-8-03	Three ..	2 to 3 ,,	2-9-03	2, 3, 4-9-03
31-8-03	Three ..	2 to 3 ,,	3, 5-9-03	5, 7-9-03
1-9-03	*Nil* ..	*Nil*	*Nil*	*Nil*
2-9-03	Four ..	2 to 3 ,,	4-9-03	6-9-03
3-9-03	Five ..	2 to 3 ,,	6, 7-9-03	7, 8-9-03
5-9-03	Three ..	1 to 2 ,,	12, 13-9 03	13, 14-9-03
7-9-03	Two ..	1 to 2 ,,	12, 13, 14, 16-9-03	13, 14, 15, 16-9-03
9-9-03	Two ..	1 to 2 ,,	13, 14-9-03	14, 15-9-03
11-9-03	Two ..	1 to 2 ,,	16, 20, 22-9-03	17, 22, 23-9-03
13-9-03	Larvæ	found dead	*Nil*	*Nil*
15-9-03	Two ..	1 to 2 days	18-9-03	20-9-03
17 9-03	Four ..	2 to 3 ,,	20-9-03	22-9-03
19-9-03	Two ..	2 to 3 ,,	22-9-03	24-9-03
21-9-03	*Nil* ..	1 to 2 ,,	*Nil*	*Nil*
23-9-03	Six ..	2 to 3 ,,	26-9-03	28-9-03

MALARIA: AS SEEN IN THE ANDAMANS PENAL SETTLEMENT.

BY ERNEST E. WATERS, M.B. (EDIN.),
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(Continued from page 448.)

THEY breed usually in stagnant pools containing vegetable débris, such as hollows in trunks of trees. This species wanders further from its breeding places than culex does, and is often found where there is no possible breeding place and where C. Fatigans disappears.

Only one variety of anopheles is known here, the A. Rossii, and that has been found only in two places. The breeding-place they affected was a series of borrow pits excavated during the building of a convict barrack. This variety was also discovered at Dundas Point. Except when these borrow pits were in existence, it was impossible to find any anopheles larvæ on Ross Island.