ments of cuticle and several head hairs identical with the dead man's. He had marked coronary atheroma, and it was realized that if he were to collapse from this (after heated argument) he could well have sustained the otherwise suspicious head wound which he bore.

The full facts are often enough to throw an entirely new light on the medical observations, often to dissipate suspicion, and a doctor need never hesitate to ask what is known so far in order to form a more definite opinion. It is remarkable how much more one sees of a case when it is ultimately argued between opposing counsel before judge and jury at a trial—a trial of possibilities. Every doctor should have an alert and open mind not readily given to always accepting the first obvious explanation of an event, though not, at the same time, stubbornly refusing to accept a reasonable possibility. Medical evidence should always be carefully reasoned and, therefore, reasonable.

Deaths from grave injuries by the roadside should not arouse suspicion until the possibility of a vehicular street

FIG. 5.—Suspicious head injury. Fracture of skull, showing significant shaping of depressed area*. Suspicion of foul play was allayed by revisiting the scene.

accident has been altogether excluded. Bodies found dead in a busy river may be expected to bear injuries sustained after death from passing craft, crabs, or recovery gear. The mutilated victim found in the yard of a block of flats is as likely to have fallen from a higher floor or the roof as to have been "beaten up." The suffocated body lying face down in the pillow is not unlikely to be that of an epileptic, and infants quite often meet their death as a result of turning their faces into the bedding: their position and deep asphyxial coloration need not arouse suspicion of foul play, though it would be wise never to overlook the possibility. Perhaps the only common error in interpreting the facts is to regard the trussed schoolboy, sometimes found hanging only partly dressed, as a suicide: his is undoubtedly an accidental death during a masochistic session.

The doctor who carefully assesses the fact of death, indicates approximately how long ago it occurred, offers a reasonable explanation of the medical findings, and encourages caution in disturbing things unless he is satisfied foul play can be excluded will not expose himself to abuse or ridicule in court, nor will he be likely to commit significant error. Crime and suicide must be recognized

without delay, and the doctor's elementary forensic training, together with common sense, will not often let him down in these matters. Where accident seems likely or the position is equivocal a cautious sifting of possibilities *pari passu* with the police inquiry is more likely to achieve the correct solution and to avoid wrecking the scene.

EPIDEMIC SMALLPOX IN JIDDAH

TREATMENT WITH ANTIBIOTICS

BY

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In October, 1949, during the closing days of the Mecca Pilgrimage, it became clear that smallpox was occurring in Mecca, Jiddah, and perhaps Medina, three towns visited by most foreign pilgrims, all of whom, it may be noted, are required to be immunized against smallpox and cholera. Epidemic form was assumed in Mecca and Jiddah, and even as late as the end of May, 1950, a few cases were still coming to light. The disease is known to have been carried by pilgrims to at least Egypt, the Sudan, Pakistan, and India.

In Jiddah particular interest centred on some 1,800 Filipinos who journeyed to and from the Hedjaz in the pilgrim ship *s.s. Christobal*, and among whom smallpox made its appearance first in Mecca. They brought cases with them on their return to Jiddah for re-embarkation. The majority, some 1,300, were re-vaccinated in Jiddah—as it turned out, not very effectively—and quarantined in overcrowded accommodation on the island of Abu Saad, off Jiddah. The remainder, some 500, evaded quarantine and revaccination and remained dispersed in agents' houses in the town. Those of all races sick from smallpox and coming to notice were admitted to hospital on the remoter island of Wasita. These Filipinos lost about 8% of their number in the Hedjaz, mostly from smallpox, at least 16% of them suffering from the disease.

Among the 500 Filipinos remaining in Jiddah town there was a sharp epidemic of concealed cases, and it seems that through breaking of quarantine the disease was carried, ironically enough, from these people not in quarantine to their brothers in quarantine on Abu Saad island in conditions ideal for the spread of an epidemic in which both contagion and air-borne infection are factors. Mass revaccination of the Abu Saad community was done again with vaccine known to be potent, and the epidemic closed within the incubation period.

In Jiddah itself, though general vaccination was ordered early, it was extremely slow in getting under way, with the result that the recorded cases—there were many unrecorded—were still rising in incidence long after cases among the Filipinos had ceased. It is thought that altogether in Jiddah there were about 1,000 cases in all races, of whom some 58% died. Most cases were in unvaccinated Saudi Arabians.

Control difficulties were great. Too many authorities were involved for efficiency and speed to be reasonably served. Procedure, staff, accommodation, equipment, supplies, drugs, disinfection apparatus, transport, and petrol were inadequate. There was, in short, general unpreparedness. The islands of Abu Saad and Wasita were shown to be unacceptable as quarantine and

isolation hospital accommodation respectively, because of their limitations in size, buildings and fittings, and approachability in bad weather and after dark. Ultimately a tented quarantine camp and an isolation hospital were erected in the desert south of Jiddah to serve until new installations of a permanent type were erected in the near-by desert.

Two major aspects of sanitation demanded attention—flies and disinfection. Flies on the islands and in the desert camp were very effectively banished by blowing a thin film of dust of "gammexane 0.34" anti-fly powder over the floors and ground from time to time with French's bellows blower, choosing windless days. Disinfection of infected houses and their contents was not achieved. All Filipinos with their effects were disinfected to a considerable extent before re-embarkation. For the terminal disinfection of the pilgrims before re-embarkation clothes and bedding were steam-disinfected in two Serbian barrels made from 40-gallon (182-litre) drums, steam being from an oil-fired portable boiler. This equipment was arranged by a local construction company. Papers, leather, and fine fabrics were put through a "bacterol" portable disinfector producing nascent formaldehyde; this procedure, though tedious, was presumed to be efficient enough to be useful. Much use was also made of exposure of kit to the midday sun in the hope that irradiation would destroy residual infection.

The quality of the statistics obtained was poor, but those produced here are sufficiently near the truth to illustrate the nature of events.

Epidemiology

Fig. 1 shows that smallpox started in Jiddah in October and assumed epidemic form in November, with a peak in that month formed mainly by non-Filipino pilgrims presumably infected in either Mecca or Medina, and coinciding with the return of the mass of the *Christobal* pilgrims from Mecca, already infected with the disease. Among the 500 Filipino pilgrims who evaded quarantine and re-vaccination there now began an epidemic of "deaths" recorded under various causes as a necessary preliminary to the issue of burial permits—for example, "fever," "pneumonia," and "unknown"—but without

FIG. 1.—Incidence of smallpox in Jiddah as suggested by certain figures. The upper two graphs are based on figures from Jiddah Hospital. All figures are considered incomplete. Vaccinations and revaccinations shown cumulatively.

doubt largely smallpox. The number of cases was estimated to be 120, and deaths 40. The peak of this epidemic preceded by a week the peak of an epidemic of smallpox (180 cases and 65 deaths) among the 1,300-odd Filipinos quarantined on Abu Saad after re-vaccination in Jiddah. The time relationship of these two epidemics in the *Christobal* Filipinos suggests clearly that, if intercommunication existed, then the disease was carried from Jiddah to Abu Saad. In fact, it is known that quarantine was poorly honoured and that intercommunication between the two Filipino communities was frequent.

Conditions on Abu Saad were extremely favourable to the spread of epidemic disease. There were gross overcrowding, climatic rigour due to wind, rain, and

TABLE I.—Jiddah, 1949–50. Morbidity and Mortality from Smallpox among non-Filipinos. Indirect Statistics (those Calculated on Grounds of Probability) are in Parentheses

Place	Period	Record	Smallpox Records		Remarks
			Cases	Deaths	
Jiddah town	Oct. 8 to Feb. 25	Registered admissions to Jiddah Hospital for smallpox	63	53	Probably mostly before December 24. There may be some overlapping with the Wasita records, as it was only in October that Jiddah Hospital actually treated cases
Jiddah town	Oct. 8 to Feb. 25	Registered deaths occurring outside Jiddah Hospital, recorded as smallpox	(86)	43	They include women and children
Jiddah town	Oct. 8 to Feb. 25	Registered deaths occurring outside Jiddah Hospital recorded as "fever" and "malaria"	(425)	(213)	Of about 425 entries, about half—including many women and children—showed the cause of death as "fever" or "malaria." As such an incidence of malaria is unacceptable* they may be fairly ascribed to smallpox, and, as it is reasonable to allow a 50% mortality, double the number represents the cases
Wasita island	Jan. 7 to Feb. 25	Clinical records and daily record (N.L.C.)	88	32†	The series is composed almost entirely of casual labour from the market in unvaccinated males from Farasan and Gizzan, who had been living in Jiddah for months or years. There were only two females in the series
Desert camp	Feb. 25 onwards	—	Epidemic closing		
Total	Oct. 8 to Feb. 25	—	(662)	(321)	48%

* Between October 1 and February 28, in Jiddah Laboratory, 237 blood examinations were done, and in no blood films from Jiddah residents were malarial parasites found. Endemic malaria rarely occurs in Jiddah.

† One death from drowning is excluded and five record cards were missing.

TABLE II.—Jiddah, 1949–50. *Treatment of Smallpox with Antibiotics in Vaccinated and Unvaccinated Arabians**

Type of Disease and Vaccination State	No.	Deaths and Fatality Rate	Corneal Lesions and Arthritis	Duration of Illness in Days Before		Average Total Dosage§ in Recoveries	
				Death	Recovery	Penicillin (million units)	Streptomycin (g.)
Confluent :							
Vaccinated	6	2	0	11	33	7.2	12
Unvaccinated	17	10 (58%)	0	8	28	6.6	11
Severe :							
Vaccinated	7	4	0	7	31	7.8	11
Unvaccinated	35	16 (45%)	1 (corneal)	6	25	7.2†	12‡
Moderate :							
Vaccinated	7	0	0	—	18	6.6	11
Unvaccinated	7†	0	0	—	20	6.6	11
Mild :							
Vaccinated	4	0	0	—	10	3.6	6
Unvaccinated	—	—	—	—	—	—	—
Totals :							
Vaccinated	24	6 (25%)	0	8	21	6.2	10
Unvaccinated	59	26 (44%)	1 (corneal)	7	24	6.9	11
Overall total	83	32 (39%)	1 (corneal)	7	23	6.6	11

* Being all cases in which clinical records were available on March 31, 1950. There were three fatal cases of haemorrhagic type.

† One drowned in delirium is excluded.

‡ One treated with aureomycin is excluded.

§ Penicillin, 600,000 units, and streptomycin, 1 g., daily; children half, infants quarter the amount.

TABLE III.—Jiddah, 1949–50. *Treatment of Smallpox with Antibiotics in Revaccinated and Vaccinated Filipino Pilgrims†*

Type of Disease and Vaccination State	No.	Deaths and Fatality Rate	Corneal Lesions and Arthritis	Duration of Illness in Days Before		Average Total Dosage‡ in Recoveries	
				Death	Discharge§	Penicillin (million units)	Streptomycin (g.)
Confluent :							
Revaccinated	11	7	0	9	22	4.8	8
Unrevaccinated	3	1	0	10	18	4.8	8
Severe :							
Revaccinated	41	6 (14%)	2 (corneal)	7	15	3.6	6
Unrevaccinated	4	2	1 (elbow joints)	8	16	5.4	9
Moderate :							
Revaccinated	30	0	1 (elbow joints)	—	14	2.4	4
Unrevaccinated	5	0	—	—	13	3.0	5
Mild :							
Revaccinated	38	0	0	—	12	1.2	1
Unrevaccinated	3	0	0	—	10	2.4	4
Total :							
Revaccinated	120¶	13 (11%)	3	8	14	2.4	3.7
Unrevaccinated	15	3 (20%)	1	8	13	2.5	5.6
Overall total	135	16 (12%)	4	8	14	2.4	3.8

* Revaccination refers only to that done on the island of Abu Saad and known on epidemiological grounds to have been effective.

† Being all cases in which clinical records were available on February 25, 1950. There were no cases of haemorrhagic type.

‡ Penicillin, 600,000 units, and streptomycin, 1 g.; children half, infants quarter amount.

§ Unnaturally high, as many stayed on to look after sick friends and relatives.

¶ One aged 4 refused injections and survived.

|| Practically all these were incubating the disease when revaccinated.

cold, shortage of food for many, and the vicious circle, only too common in such circumstances, of (a) deficiency disease (mainly beriberi and hyporiboflavinosis), (b) dysentery and diarrhoea, and (c) fly infestation. A sudden crop of 15 cases on Abu Saad led to immediate mass revaccination for the second time with vaccine of proved value. The epidemic closed in 14 days. Factors favouring these Abu Saad Filipinos were a robust physique and previous vaccination experience.

The epidemic among Jiddah townspeople, as suggested by the recorded cases, came to a peak in February (Table I). General vaccination, though ordered on October 29, had crept forward with painful slowness. Other adverse factors were apparent shortage of potent vaccine, ineffectual vaccination, inefficient notification of cases, no vaccination or segregation of contacts, no disinfection of infected houses and effects, cold weather, and public apathy. On the credit side may be put general vaccination, albeit slow, vaccination of new arrivals to some degree, and perhaps stock experience of the disease.

The method of vaccination used in the clearly successful revaccination on Abu Saad was the multiple-pressure method of Leake, the arm being cleaned with

soap (a little) and water. No bad reactions were seen apart from one case of generalized vaccinia inevitably diagnosed initially as smallpox, and several reactions of primary type in Filipinos dying of smallpox, and who may have evaded previous vaccination or washed their arms after its being done, and were well on in the incubation period when revaccinated for the second time.

Treatment

In view of the observations of Johnstone and Fluker (1949), once it was possible to organize their administration, procaine penicillin G with aluminium monostearate, 600,000 units once daily, and streptomycin, 0.5 g. twice daily, were given until the lesions were dry, streptomycin being discontinued on the advent of severe stomatitis in some cases (see Pallister, 1949). Either vitamin-B complex or multivitamin tablets were given as long as antibiotics were being administered. Cases were given, when they could take them, at least 2 pints (1.1 l.) of milk, with two eggs as egg-flip, and the juice of two oranges daily until convalescence was clearly beginning.

The results of treatment are analysed in Tables II and III. Cases were divided into "confluent," with more spots confluent than not; "severe," with fewer

spots confluent than not; "moderate," with all spots discrete but hard to count; and "mild," with discrete spots easy to count. The counting area was the face.

The epidemic was characteristically of confluent type and the overall estimated case fatality was 58%. This is compatible with the opinions of various authorities (Ionescu-Mihaesti and Guica, 1945; Frazer and Stallybrass, 1948; Tidy, 1949). The Jiddah series of treated cases in unvaccinated and vaccinated non-Filipinos had case-fatality rates of 44% and 25% respectively, with an overall rate of 39%, showing the modifying effect of vaccination and suggesting the beneficial effect of antibiotic treatment. The treated cases in the vaccinated and revaccinated Filipinos had case-fatality rates of 20% and 11% respectively, with an overall rate of 12%, showing the modifying effect of revaccination and vaccination and again suggesting the beneficial effect of antibiotic treatment.

Clinically, it was noted that patients treated with antibiotics seemed to get over the secondary fever stage without much difficulty, and that the relative absence of pus made nursing less offensive and therefore enabled it to be more effectively carried out. Many vesicles appeared to abort, particularly those on the legs, which, no doubt appearing later in any case, met a stronger level of antibody and antibiotic concentration in the blood. Unpleasant sequelae were rare (see Tables II and III), and it seems probable that these antibiotics shortened the convalescence period.

Five early severe cases in young unvaccinated Arabians were given "aureomycin" orally in daily dosage of 1.5 to 2 g. divided four- or six-hourly, for two or three days (not enough was available for more extensive trial). In three cases it seemed that mental confusion—surprisingly rare in the mass of cases—was directly attributable to the drug, as the symptom disappeared promptly when it was stopped. One patient died. The other four were treated, after the aureomycin was finished, with the dosage of penicillin and streptomycin given to the mass of cases, and they seemed to pass into convalescence with unusual ease; the papules may have been smaller than usual and may have umbilicated more early and dried away more quickly. The drug seems worthy of further trial in the early stages.

Other Clinical Observations

Repeatedly, when moving through crowds of patients, and later when handling quantities of luggage tickets which had been used for bedside clinical records, it was noticed that on moistening the lips a bitter taste was experienced. Movement of the bedclothes or of the labels seemed to accentuate it. It was not noted in contact with chicken-pox, had not been noted before in other circumstances, and has not been noted since. As it was experienced with tickets that had been baked to sterilize them, it cannot necessarily be due to living smallpox virus, but it may have been due to the dead virus or small particles of pock debris. It is of possible interest in view of the belief that smallpox infection may be air-borne.

Most staff on the islands, and most of those repeatedly visiting them, had attacks (one each only) of fever for one or two days or so, and it seems that this was probably "contact fever"—that is, aborted smallpox—there being no initial or focal eruptions. That this "contact fever" was prominent among the discomforts of the Filipinos quarantined on Abu Saad island is shown

FIG. 2.—Jiddah, 1949-50. Vaccinations and cases of smallpox and contact fever among Filipino pilgrims on Abu Saad island.

by Fig. 2, which reveals peculiar oscillations in the records of "fever" in the out-patient clinic, run fitfully when staff was available to give simple treatments for crudely classified minor ailments not requiring the attention of the only doctor available. Among these people no blood films were positive for malaria, splenomegaly was not noted, shivers or sweats were not complained of, and influenza and nasal colds seemed to be absent. Exceptional peaks of requests for "aspirin for fever" were experienced, associated with large numbers of fresh cases of smallpox and exceeding these in value by 100% or more. On the days that the smallpox cases appeared in large numbers the aspirin demands dropped very considerably, suggesting that the fever inspiring them had represented both aborting smallpox and developing smallpox.

Fig. 3 is the clinical chart of one such case of presumed contact fever. No aches or pains were experienced, merely a little malaise at the height of the fever that disappeared promptly with the sweating after 10 gr. (0.65 g.) each of aspirin and Dover's powder.

Summary

Epidemic smallpox occurred in the Hedjaz in 1949-50, and vaccination and revaccination were effective when properly carried out. One subepidemic in a closed community terminated 14 days after a mass revaccination.

There were estimated to have been 1,000 cases in Jiddah, with an overall case fatality of about 58%.

In revaccinated and vaccinated Filipino pilgrims, those treated with penicillin and streptomycin had a case fatality of 12%.

FIG. 3.—Jiddah, 1949-50. Clinical chart of a case of presumed contact fever. The patient was revaccinated on November 20, 1949, and gave an accelerated reaction of immunity. Exposure to infection was constant daily from December 20.

In vaccinated and unvaccinated non-Filipinos (mostly unvaccinated Saudi Arabians) those treated with these antibiotics had a case fatality of 39%.

Previous vaccination is clearly shown as still the best guarantor of good prognosis in smallpox.

It is considered that penicillin and streptomycin, as administered in these cases, favourably influenced the course of the disease by reducing case fatality, the incidence of serious sequelae, and the duration of convalescence. A particular virtue appeared to be the comparative absence of pus, which made nursing easier.

A few observations on the response of confluent smallpox to aureomycin in young patients with no vaccination experience suggest that the drug is worthy of further trial in early cases.

Two phenomena appearing in association with mass smallpox are illustrated and commented on. They are a bitter taste on moistening the lips, and "contact fever."

The question seems to arise whether all strains of vaccinia used in the preparation of lymph are equally successful in protecting against all strains of variola.

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THE NEW GENEVA CONVENTIONS

The International Committee of the Red Cross (7, Avenue de la Paix, Geneva) has issued in volume form the text of the Geneva Conventions which were concluded at the diplomatic conference held at Geneva in 1949. Fifty-nine Governments sent plenipotentiaries to that conference and four others sent observers. Four conventions were established: the first for the protection of wounded and sick in the armed forces in the field; the second for the protection of the wounded, sick, and shipwrecked in the armed forces at sea; the third for the protection of prisoners of war; and the fourth—a totally new convention necessitated by the development of modern warfare—for the protection of civilian persons in an area of hostilities.

A certain background of history is necessary for the understanding of these conventions. In 1863 five citizens of Geneva, the forerunners of the present International Committee, brought the Red Cross into being. The Convention which they established for the amelioration of the wounded and sick in war gave the necessary impetus to the Red Cross movement throughout the world, but, as was only to be expected, it proved to be imperfect, and various proposals for revision were made. In 1906 a diplomatic conference established a revised text, considerably expanding the original, although the fundamental principles of that early treaty remained unshaken. Another diplomatic conference was held in 1929, when the text was again revised in the light of the experience of the first world war. A further diplomatic conference was contemplated for 1940, but was not held. After the second world war the International Committee prepared new drafts. These were examined by experts and by an International Red Cross Conference in 1948, after which they were sent to the diplomatic conference, which opened in Geneva on April 21, 1949. After four months' continuous debate, chiefly in four committees, the final act was signed on August 12. The act was signed on behalf of some 60 Governments, but it does not come into force for the contracting party until six months after it has been ratified by the Government concerned, and many Governments have been very tardy over the formalities of ratification.

Wounded and Sick in the Armed Forces

The first three conventions extend and bring up to date what was already established on behalf of the wounded and sick in the armed forces on land and sea and also for prisoners of war. One provision in the first convention concerns medical staff who fall into enemy hands. Instead of being immediately repatriated, they may in certain circumstances be retained to care for prisoners of war so far as the numbers of such prisoners and their state of health require it. In such cases medical staff—the same applies to chaplains—are not to be deemed prisoners of war themselves, although they are to benefit by all the provisions of the Geneva Convention relating to prisoners. They are to continue to carry out their duties on behalf of the prisoners, preferably those of the armed force to which they themselves belong. In each camp a senior medical officer of the highest rank is to be responsible to the military authorities of the camp for the professional activity of the retained medical staff. It is also provided that medical equipment need no longer be handed back to the belligerent to whom it belongs, but may be reserved for the care of the wounded and sick.

The second convention simply adapts to sea warfare the provisions of the first, and the third convention is framed according to the principle that a combatant who has been captured can be prevented from taking up arms again, but the rights against his person are limited to that, and he must be treated humanely and honourably and released at the conclusion of hostilities. One article (30) reads:

"Every camp shall have an adequate infirmary where prisoners of war may have the attention they require, as well as appropriate diet. Isolation wards shall, if necessary, be set aside for cases of contagious or mental disease."

Prisoners who need special treatment, a surgical operation, or hospital care are to be admitted to any civil or military medical unit where such treatment can be given, even if their repatriation is contemplated in the near future.

Protection of Civilians in Wartime

The fourth convention, entitled "Geneva Convention relative to the protection of civilian persons in time of war," has been long awaited. The idea of it was first mooted at the end of the first world war, when it became clear that civilians were exposed to the same—sometimes even greater—dangers as the armed forces. A new idea in this convention is the setting up of hospital and safety zones and localities. Article 14 reads:

"In time of peace the High Contracting Parties and, after the outbreak of hostilities, the Parties thereto, may establish in their own territory and, if the need arises, in occupied areas, hospital and safety zones and localities so organized as to protect from the effects of war, wounded, sick, and aged persons, children under 15, expectant mothers, and mothers of children under 7. Upon the outbreak and during the course of hostilities, the Parties concerned may conclude agreements on mutual recognition of the zones and localities they have created. . . ."

For this purpose a large medical staff will be needed, and staff on such duty will have the benefit of all the protection the zone offers as a return for their services. A slightly different conception appears in a later article (15) concerning neutralized zones:

"Any Party to the conflict may, either direct or through a neutral State or some humanitarian organization, propose to the adverse Party to establish in the regions where fighting is taking place, neutralized zones intended to shelter from the effect of war the following persons, without distinction: (a) wounded and sick combatants and non-combatants; (b) civilian persons who take no part in hostilities, and who, while they reside in the zones, perform no work of a military character."

These zones are more temporary in character, and, apart from the wounded and sick, would afford refuge to all not directly taking part in the fighting. Perhaps the article of greatest interest is that dealing with the protection of hospitals. Civilian hospitals may in no circumstances be the object of attack, and are to be marked with the distinctive