



A SMALLPOX OUTBREAK IN MERKA TOWN, SOMALIA

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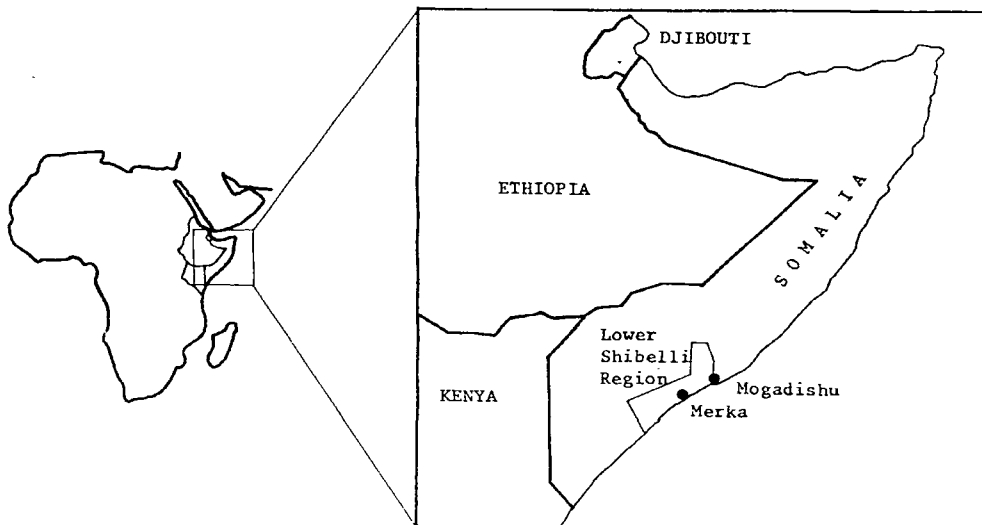
1. Summary

This paper describes the events concerned with the discovery, investigation and containment of a smallpox outbreak which occurred in Merka town in Somalia, in October 1977. Since this outbreak occurred, surveillance in the Horn of Africa and elsewhere in the world has failed to detect more recent smallpox.<sup>a</sup> It thus may prove to be the world's last naturally occurring outbreak.

2. Detection of Outbreak

On 31 October 1977, an urgent telephone call was received at the "Zeropox" (headquarters) office of the Smallpox Eradication Programme in Mogadishu. The senior Epidemiologist posted in Lower Shibelli Region reported a new outbreak of smallpox in Merka town, 130 km south-west of the capital (Figure 1).

FIG. 1: LOCATION OF MERKA TOWN



Clinically, the diagnosis was definite and preliminary investigation revealed the possibility that hundreds, both in Merka and in the surrounding districts, may have had face-to-face contact with the patient.

<sup>a</sup> In August and September 1978 a smallpox outbreak was reported in Birmingham, U.K., involving two cases. The source of infection is thought to be laboratory stocks of variola virus.

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Merka is a busy regional centre and international port with an estimated population of 26 000. It is only two hours drive by surfaced road from Mogadishu and is connected by bus services with the six other district towns in the region. Most of its inhabitants are employed in local light industry or the port or conduct various small businesses. Administratively the town is divided into three wards or cantons, each having four branches with 200-400 houses. The patient was detected in the Horseed ward which forms the south-western sector of the town.

### 3. Case History

- (i) Patient: Ali Maow Maalin, 23 year old-male cook at the hospital in Merka
- (ii) Vaccination history: Previously unsuccessfully vaccinated at an unknown date
- (iii) Acute illness; sequence of events, 22 to 31 October:

22 October: The patient developed a fever while at work and went home.

23-24 October: He stayed at home and was visited by many friends including neighbours and hospital employees.

25 October: Admitted to the medical ward of Merka hospital with a diagnosis of malaria, he was treated accordingly. He was visited by many friends and hospital employees and walked freely through the hospital and outside the compound to receive his salary and to visit friends.

26 October: He developed a rash in the evening.

27 October: The patient was discharged after a provisional diagnosis of chickenpox was made by the attending physician.

28 October: He remained in his home compound, very ill, and was visited by friends and relatives.

29 October: The patient himself suspected smallpox but through fear of being sent to the isolation camp did not inform the authorities.

30 October: A male nurse from the hospital reported the case to the Regional Health Superintendent.

31 October: The Smallpox Eradication Programme Epidemiologist was informed, investigated the case and diagnosed his illness as smallpox.

- (iv) Subsequent illness, 31 October to recovery:

The patient experienced moderately severe smallpox with a discrete rash. On 31 October, when he was first examined, the rash was at the pustular stage with maximum lesions on the extremities, including the palms and soles (Annex 1). By 15 November the rash had reached the scab stage. The patient subsequently recovered without complications. He was discharged from the isolation centre at the end of November.

### 4. Laboratory diagnosis

Specimens for laboratory diagnosis were collected on 31 October and forwarded via Geneva to the WHO Collaborating Centre, Viral Exanthems Branch, Virology Division, Center for Disease Control, Atlanta, USA.

The diagnosis of smallpox was confirmed by electron microscopy, growth on chorioallantoic membrane of chick embryos and precipitation in gel.

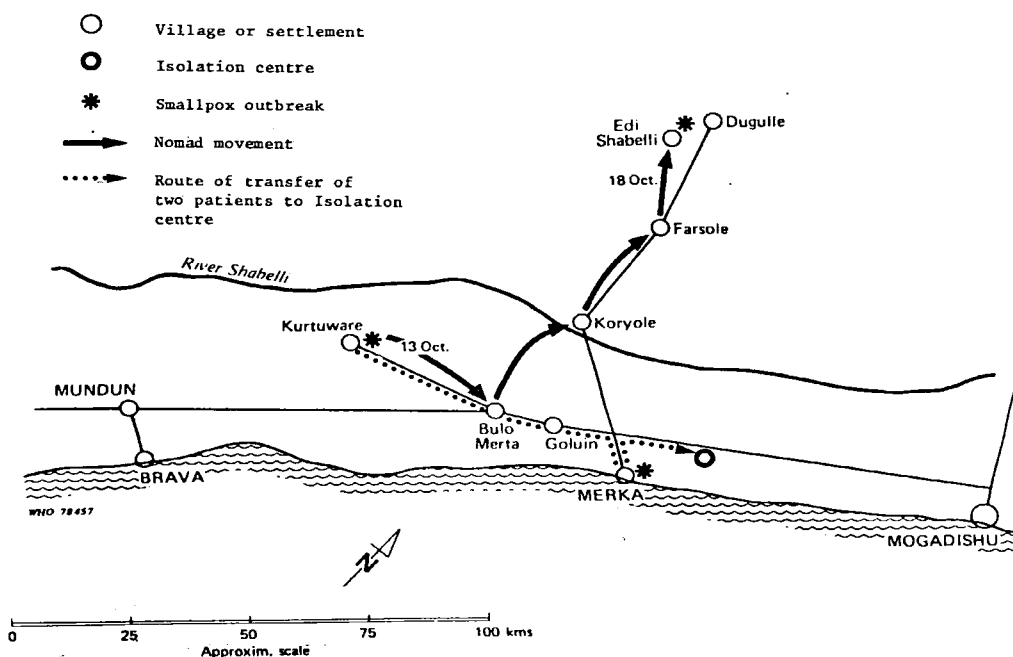
### 5. Source of Infection

The source of infection was rapidly identified during interview of the patient on 31 October. Two smallpox cases from Kurtuware settlement, 17 miles north of Merka, had been sent by vehicle to an isolation camp near Merka. On 13 October the vehicle had stopped briefly at Merka hospital to obtain directions. Ali Maalin travelled with them for less than one kilometre from the hospital to the home of the local smallpox surveillance team leader who directed the driver to the isolation camp. This was his only contact with the patients, a six-year old girl with severe smallpox who died three days later, and a two-year old boy in the papular stage of the rash.

The smallpox outbreak at Kurtuware was thoroughly investigated. The nomad group concerned was thought to have become infected in mid-August 1977. After passing through Kurtuware, another case occurred amongst them at Edi Shibelli on 18 October. Subsequent surveillance in the Lower Shibelli Region suggests that these outbreaks, in Edi Shibelli and in Merka, were the final links in that particular chain of transmission (Figure 2).

Elsewhere in the country no evidence could be found, at that time or subsequently, of continuing transmission of the disease.

FIG. 2: SOURCE OF INFECTION



### 6. Containment Measures

Additional national and WHO epidemiologists were immediately transferred to Merka from other posts and a detailed plan of action formulated.

### 6.1 Isolation of the Patient

Initially the patient was isolated at his home, a room which he rented approximately 200 metres from Merka hospital. A 24-hour guard was posted. However, since his house was located in a densely populated urban area, it was decided to relocate the patient in an isolation camp at El Warego, about 10 km from Merka near the Mogadishu road. He was transferred there on 2 November. One police guard and one militia guard lived at the isolation centre permanently until the patient was discharged four weeks later.

### 6.2 Contact Tracing

Possible contacts included all hospital staff, medical and surgical ward patients from 21-27 October, visitors to the medical ward on the days of Ali's hospitalization and his family, neighbours and friends who had visited him in the hospital or at home. Also to be considered were others in the town who might have had exposure to Ali during the prodromal period. A total of 161 possible contacts was identified, located and interviewed, in some cases necessitating visits to places more than 120 km north and south-west of Merka. They were classified according to the intensity of their exposure (that is, whether or not face-to-face contact could be remembered by either party) and the presence or absence of a vaccination scar said to have resulted from vaccination within the previous three years. Possible contacts without evidence of successful vaccination within the preceding three years were considered "unprotected". "Incidental contacts" were considered to be three individuals who had been in the same room with Ali at some time since the day before the onset of fever but who had not had close exposure. Table 1 shows the distribution of possible contacts by degree of exposure and vaccination status prior to exposure.

TABLE 1

#### CLASSIFICATION OF POSSIBLE CONTACTS BY DEGREE OF EXPOSURE AND VACCINATION STATUS

Vaccination Status Prior to Exposure	Degree of Exposure		Total
	Face-to-Face	Incidental	
Vaccinated within past 3 years <sup>a</sup>	58	62	120
Vaccinated more than 3 years previously <sup>a</sup>	21	) ) ) ) 8	) ) ) ) 41
Unvaccinated <sup>b</sup>	12	) )	) )
TOTAL:	91	70	161

<sup>a</sup> Refers to presence of a vaccination scar said to have resulted from vaccination within 3 years, or more than 3 years previously.

<sup>b</sup> Refers to the absence of a vaccination scar, i.e. persons never vaccinated or unsuccessfully vaccinated.

Of 33 face-to-face contacts who had no evidence of successful vaccination within the previous three years, twelve had no vaccination scar whatsoever and therefore were considered to be at maximum risk. Six of these were hospital employees, two were medical ward patients and three were visitors to that ward. Only two of these contacts were children, one an infant. All known and possible contacts and members of their families were vaccinated. Incidental contacts were visited at least twice; "protected" face-to-face contacts were visited an average of four times each; and those classified as "unprotected" six times each during the potential incubation period. All face-to-face contacts were under surveillance for at least 18 days after their exposure to the patient. During this surveillance period, two hospital employees and three neighbourhood contacts developed fevers and were placed in isolation in their homes; none developed a rash. No secondary cases occurred among the 161 contacts.

### 6.3 Special Measures at Merka Hospital

Due to the numerous contacts with the patient while at the hospital the following measures were taken:

- (a) all in-patient discharges were postponed and admissions were restricted to emergencies only;
- (b) all out-patients were referred to alternative health facilities;
- (c) all hospital patients were immediately vaccinated;
- (d) all health staff in Merka town, as well as their households, were vaccinated;
- (e) all surgical and medical patients were quarantined;
- (f) all hospital staff and patients were checked daily for fever;
- (g) warning signs were posted and a 24-hour police guard was posted at the hospital entrance.

Patients due for discharge were allowed to leave the surgical ward on 13 November and the medical ward on 17 November. The hospital was re-opened to the public one week later.

### 6.4 Vaccination and Search for Further Cases

Of highest priority was Horseed ward, where the patient's house and Merka hospital were located (Figure 3).

The patient's house and the 50 closest neighbouring houses were visited by a two-man team of local residents who listed and vaccinated all inhabitants and visitors. Teams, each comprised of two smallpox programme staff, one local party leader and one policeman visited the remaining houses of Horseed ward. The teams worked at night to achieve the maximum possible vaccination coverage of the population. A first round of vaccination was completed in three nights, that is by the night of 2 November.

Thereafter, a team of ten persons was assigned to revisit all households in Horseed ward searching for smallpox cases, vaccinating newly-returned residents or visitors and revaccinating those whose first vaccination was unsuccessful.

In the remaining two wards, Wadajir and Hawl Wadak, the teams visited all houses listing and vaccinating all residents during the following seven days. Thus, by 10 November, the whole town of Merka had been covered by one search and vaccination round.

This intensive activity was followed by repeated three-day searches of the whole town during each of the six weeks of the observation period. The scope and findings of these activities are shown in Table 2.

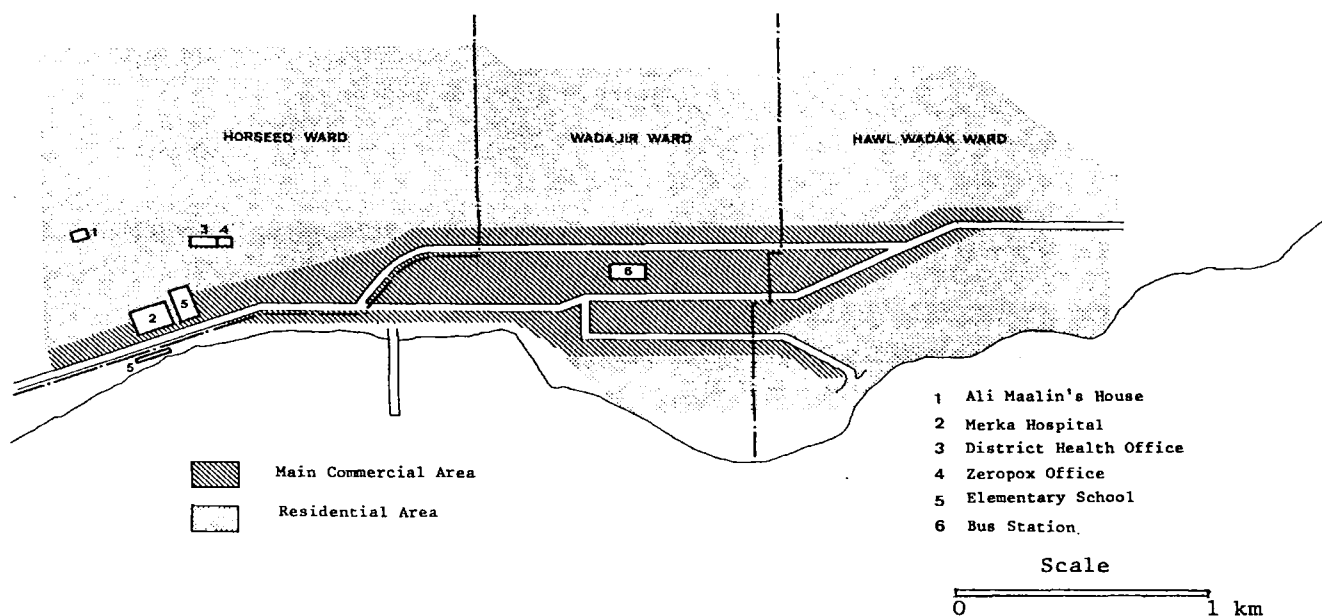
TABLE 2  
RESULTS OF CONTAINMENT VACCINATION AND SEARCH OPERATION  
MERKA TOWN - NOVEMBER 1977

Area	Period	Number of houses <sup>a</sup>	Popula- tion <sup>a</sup>	Number of persons vaccinated	Number of rash cases detected		
					Smallpox	Chickenpox	Others
Horseed	31.10-2.11	792	5 000	3 558	0	1	4
Wadajir	3.11-6.11	738	4 300	2 873	0	1	1
Hawl Wadak	7.11-13.11	1 007	10 502	8 092	0	1	6
Checkposts	31.10-14.11	-	-	40 254	0	0	0

<sup>a</sup> Estimated

With police assistance, a checkpoint was quickly established on the road into Merka to stop all traffic entering or leaving, and to vaccinate all passengers. Those on foot were also vaccinated and three additional checkpoints covered the three footpaths into Merka. These fixed vaccination/surveillance posts were maintained for six weeks.

FIG. 3: MAP OF MERKA TOWN



### 6.5 Publicity

Public meetings were held in the orientation centres of all wards to educate the public with respect to smallpox vaccination and the need to report illnesses with rash to the health authorities. A reward of two hundred Somali Shillings for reporting a smallpox case was widely publicized, as was the location of vaccination centres.

7. Comments

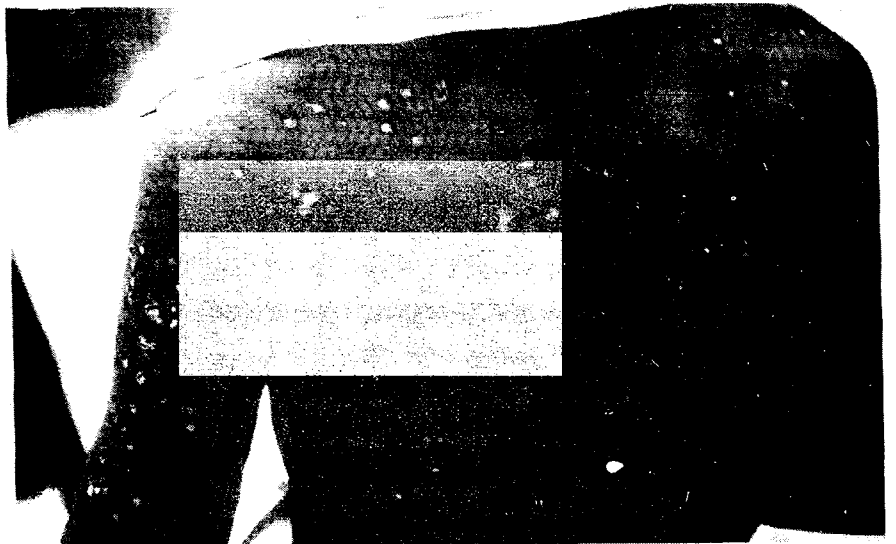
During 14 months prior to discovery of this case, intensive surveillance had detected 3 267 cases of smallpox in Somalia. In the following 12 months, despite more rigorous and extensive surveillance throughout the country, not a single case was detected. In the adjacent countries of Djibouti, Ethiopia and Kenya, where there was a potential risk of smallpox being imported, the last known cases were reported in April 1974, August 1976 and February 1977, respectively. Continuing surveillance since then failed to detect additional cases. Elsewhere in the world no smallpox has been detected during the last two years. Thus, the smallpox outbreak in Merka town currently appears to be the last case of endemic smallpox. However, this will be confirmed through continuing surveillance.

8. Acknowledgements

Many national and international staff worked in the investigation and containment of the outbreak. The following, however, are specifically acknowledged for their active field work, collection of data and preparation of this report: Dr Abdullahi Deria (National Programme Manager), Dr D. Bashir (Regional Epidemiologist), Drs Z. Jezek, K. Markvart, J. Weisfeld (WHO Epidemiologists), Mr P. Carrasco (Operations Officer). The report was edited by Dr J. Tulloch, STC, SME, WHO.

ANNEX 1

PATIENT DURING  
THE SECOND WEEK OF ILLNESS<sup>a</sup>



<sup>a</sup> Photographs taken by  
Dr J. Weisfeld,  
WHO Epidemiologist