OTITIS EXTERNA

A LIMITED STUDY IN GERMANY AND CYPRUS

By RALPH D. STRIDE (Bristol)

IT WAS in 1934 that Palmer published his account of otitis externa occurring in troops in India. Since that year there have been numerous reports on this disorder from tropical, sub-tropical and temperate zones. Morley (1938) and Dossetor (1957) wrote of Aden, while Daggett (1942) wrote of Malta and Collins (1943) and Birrell (1945) described their experiences in the Middle East. Syverton *et al.* (1946) described the condition in the Mariannas and Salvin and Lewis (1946) in Maryland, while Jamieson (1946), Stewart (1951) and Keogh and Russell (1956) reported on the condition in Britain.

It is not the purpose of this paper to compare the nature of otitis externa in Germany and Cyprus or to assess the results of a particular form of treatment, but rather, it is intended to confirm some findings, contest others, and emphasize some less well known features.

Bacteriology

Hermitte (1932) reported *Pseudomonas pyocyaneus* infections of the external ear in the Seychelles. Morley (1938) found *Pseudomonas pyocyaneus* in 61·5 per cent. of cases in Aden, while Dossetor (1957) in his investigations at Aden reported a 50 per cent. incidence. Daggett (1942) found the organism in 64 per cent. of cases in Malta. The high incidence of *Ps. pyocyaneus* infections of the external ear occurring in the Middle East has also been noted by Collins (1943) and Birrell (1945). Basil-Jones (1945) reported *Ps. pyocyaneus* in 73·3 per cent. and *Staphylococcus aureus* in 20·8 per cent. of cases in New Guinea, while in the Mariannas, Syverton *et al.* (1946) found a 68·6 per cent. incidence of *Ps. pyocyaneus* and a 20 per cent. incidence of *Staph. aureus*. Salvin and Lewis (1946) reported *Ps. pyocyaneus* in 53·6 per cent. of cases and *Staph. aureus* in 1·2 per cent of cases in Maryland. In the United Kingdom, Stewart (1951) found *Ps. pyocyaneus* in 11·9 per cent. and *Staph. aureus* in 20·6 per cent. of cases, while Keogh and Russell (1956) reported *Ps. pyocyaneus* in 7·7 per cent. of their cases.

In the present investigation, in Germany, the commonest organism found in pure growth was *Staph. aureus* (24·4 per cent.), *Ps. pyocyaneus*

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was found in only 11·7 per cent. In Cyprus, *Staph. aureus* was found in 22·9 per cent. of cases and *Ps. pyocyaneus* in 32·7 per cent.

B. proteus was found in Germany in 11·1 per cent. and in Cyprus in 4·6 per cent. of cases, while *B. coli* was found in Germany 2·2 per cent and Cyprus 5·2 per cent.

Staph. albus occurred in 4·4 per cent. of cases in Germany and 13·7 per cent. in Cyprus. Diphtheroids were found only in mixed cultures in both Germany and Cyprus. Fungal infection with Aspergillus niger was found in 2 per cent. of cases in Cyprus.

TABLE I.

BACTERIOLOGY OF THE EXTERNAL EAR.

Organism	Germany		Cyprus		Total	
Pure growths.		%		%		%
Ps. pyocyaneus	5	(11·1)	50	(32·7)	55	(27·8)
B. proteus	5	(11·1)	7	(4·6)	12	(6·1)
B. coli	1	(2·2)	8	(5·2)	9	(4·5)
Staph aureus (coag. positive)	11	(24·4)	35	(22·9)	46	(23·2)
Staph. albus	2	(4·4)	21	(13·7)	23	(11·6)
Mixed growths						
Ps. pyocyaneus and *Staph. aureus*	3	(6·7)	5	(3·3)	8	(4·0)
Ps. pyocyaneus and *B. proteus*	1	(2·2)	3	(2·0)	4	(2·1)
Ps. pyocyaneus and *B. coli*	0	—	1	(0·7)	1	(0·5)
B. proteus and *Staph. aureus*	2	(4·4)	2	(1·3)	4	(2·0)
B. proteus and Diphtheroids	2	(4·4)	0	—	2	(1·0)
B. coli and *Staph. aureus*	3	(6·7)	1	(0·7)	4	(2·0)
B. coli and Diphtheroids	1	(2·2)	0	—	1	(0·5)
Staph. aureus and Diphtheroids	4	(8·9)	0	—	4	(2·0)
Staph. albus and Diphtheroids	2	(4·4)	0	—	2	(1·0)
Aspergillus niger	0	—	3	(2·0)	3	(1·5)
No growth	3	(6·7)	17	(11·1)	20	(10·1)
No examination	25	—	7	—	32	—
TOTALS	70		160		230	

Bacteriology of the nasal vestibule and finger nails

Gillespie (1939) noted an association between the incidence of pathogenic staphylococci in the nose and on the skin surface. Stewart (1951) considered that contaminated finger nails were of ætiological significance in otitis externa. Brodie *et al.* (1956) reported on the nasal and fæcal carriage of staphylococci.

In Germany five cases out of the 45 examined bacteriologically were found to have aural and nasal *Staph. aureus* infections with similar antibiotic sensitivities, while three of the cases were found to harbour a similar staphylococcus within the nailfold.

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In Cyprus 35 out of 153 cases examined bacteriologically were found to have *Staph. aureus* present in both aural and nasal swabs. In 29 of these, swabs from the nailfolds revealed similar organisms. In 34 cases aural and nailfold swabs were similarly infected.

Finger nails

In Germany 10 cases were examined (total 70 cases).

Short — 6	Smooth — 2	"Clean" nailfold — 3
Long — 4	Irregular — 8	"Dirty" nailfold — 7
10	10	10

Of those with "clean" nailfolds, bacteriological culture produced no growth, while in three of those with "dirty" nailfolds, culture produced a growth of staphylococcus similar to that infecting the external ear.

In Cyprus 156 cases were examined (Total 160 cases).

Short — 93	Smooth — 76	"Clean" nailfold — 81
Long — 63	Irregular — 80	"Dirty" nailfold — 75
156	156	156

Of those with "clean" nailfolds, culture revealed 32 to be infected, while of those with "dirty" nailfolds 37 were infected with staphyloccoci similar to those in the external ear. (The terms "clean" and "dirty" refer to appearance.)

Skin

The following disorders of the skin were noted in Cyprus.

Folliculitis barbae	— 2
Acne vulgaris	—41
Tinea	— 6
Scabies	— 1
Eczema	— 2
Congenital ichthyosis	— 1
Penicillin rash	— 2
	55—34·4 per cent.

Dossetor (1957) found that 52 per cent of his cases suffered from Acne vulgaris and 24 per cent. from Tinea (45 per cent. and 30 per cent. in controls).

Hair

In Cyprus the head and scalp were examined in 150 cases. Dandruff (Pityriasis simplex) was present in 55 (37·3 per cent.).

34 (22 per cent.) washed their hair daily.

24 (16·0 per cent.) washed their hair three times per week.

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39 (26·0 per cent.) washed their hair two times per week.
48 (32·0 per cent.) washed their hair once per week.
5 (3·3 per cent.) washed their hair once per fortnight.

The method employed in hair washing was to wet the hair under the shower, lather with soap and then to stand under the shower for rinsing. The washing necessarily ran down over the ears, neck and trunk.

Dossetor (1957) found that 17 per cent. of his cases suffered from Pityriasis simplex.

Swimming

In Cyprus it was found that 80 patients (50 per cent.) with otitis externa had been swimming within 14 days or less of attending for

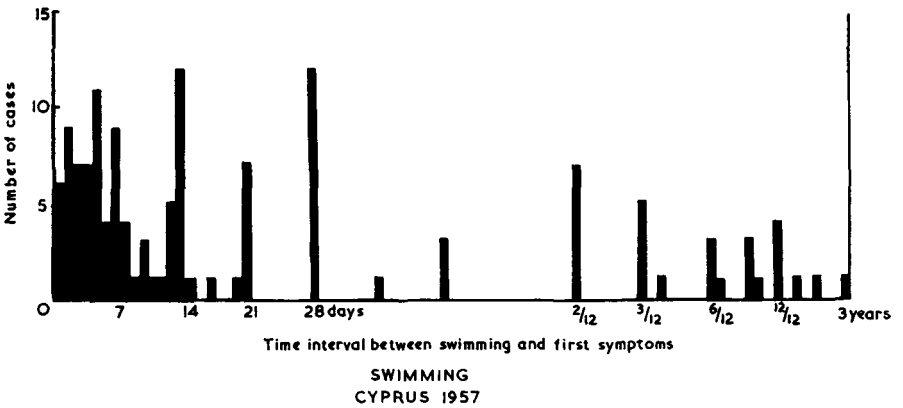


FIG. 1.

treatment. Of these 40 patients (25 per cent.) had been swimming within five days or less. A further 25 per cent. of patients had been swimming within six months of the onset of otitis externa. (Fig. 1).

Hermitte (1932) considered sea bathing an important ætiological factor. Morley (1938) noted that 45 per cent of his cases had been swimming within one month of attending his clinic. While Daggett (1942) believed that swimming could be regarded as an uncommon contributing cause. Birrell (1945) considered that in the "tideless" Mediterranean, water was permanently dirty on frequented beaches. Syverton *et al.* (1946) found that 20 per cent. of their cases had been swimming within two weeks, while Dossetor (1957) reported that 72 per cent. of his cases had recently been swimming.

In Cyprus it was noted that on many of those sandy beaches commonly visited by troops, fresh human fæces were to be found behind rocks above and below "high"—tide mark. The incidence appeared to increase in the late summer.

Keogh and Russell (1956) reported the 56 per cent. of their cases

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showed evidence of contamination from the anal region. They believed that transference was by the fingers.

Service in the Field

	Germany %	*Cyprus* %
1— 6 months	47·8	41·9
7—12 months	13·1	38·5
13—24 months	30·4	16·8
Over 25 months	8·7	2·8

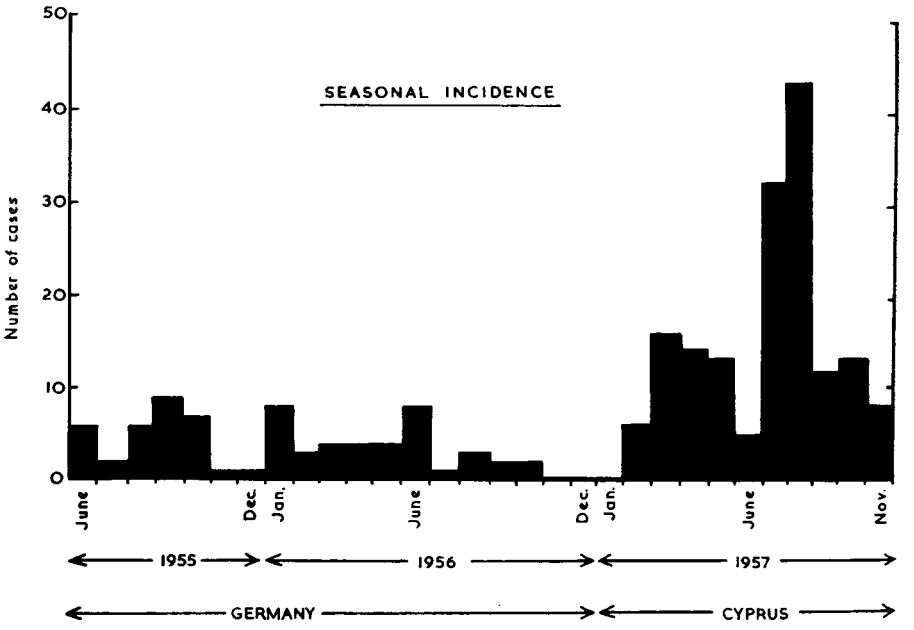


FIG. 2.

In both Germany and Cyprus over 40 per cent. of cases of otitis externa had been in the country for 6 months or less.

In Cyprus the incidence remained high in the second six months period and fell thereafter, while in Germany the incidence remained low after seven months residence in the country.

Previous occurrence

In Germany 84·3 per cent. of cases had a history of one previous attack of otitis externa, while 11·4 per cent. had a history of several attacks.

In Cyprus 55·5 per cent. of cases were having their second attack and 9·4 per cent. of cases their third (or more) attack.

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Otitis Externa

Seasonal incidence

In Germany there was no marked seasonal variation in the incidence of otitis externa, except that the condition was uncommon in November and December. (Fig. 2.)

In Cyprus there was a marked rise in the incidence of otitis externa from March to August, with a sharp fall after September. The rising incidence closely followed the rising temperature and falling humidity (Fig. 3).

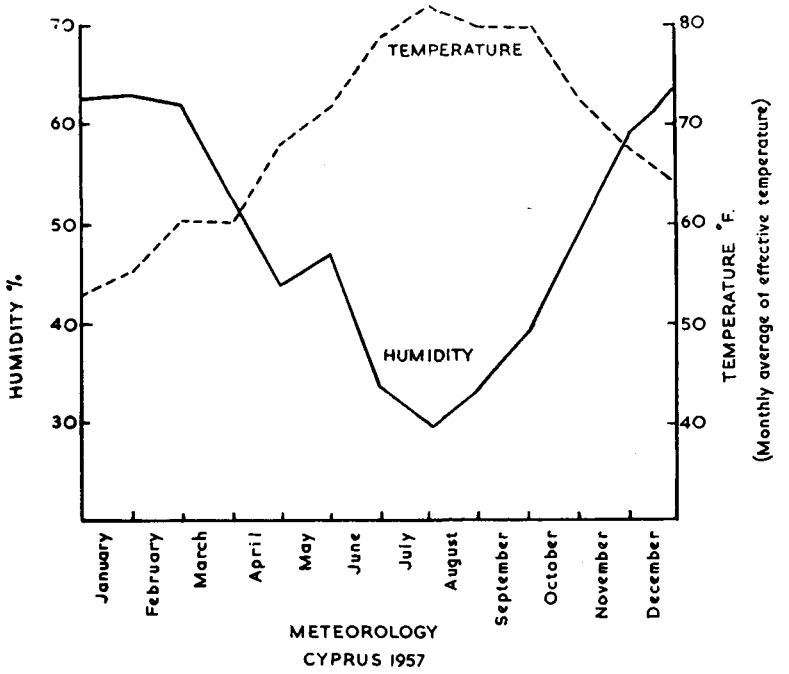


FIG. 3.

Morley (1938) noted that in Aden the incidence of otitis externa was highest over the period May to June and June to September. He associated this with the rise in temperature and humidity and the absence of overnight cooling-off. Daggett (1942) found that in Malta the maximum incidence was from June to September.

Age incidence

	Germany %	*Cyprus* %
1—18 years	4·5	6·9
19—20 years	45·5	45·0
21—30 years	33·3	34·4
31 years upwards	16·7	13·7

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In both Germany and Cyprus 45 per cent. of the cases of otitis externa were in the age group 19-20 years. This was the age group of the national service recruit. Over one third of the cases were in the third decade. This group consisted largely of regular service men and their wives.

Onset

	Germany %	*Cyprus* %
1— 7 days	25·7	56·3
8—14 days	14·3	20·0
more than 14 days	60·0	23·8

These figures were calculated from the time of appearance of the first symptoms, to attendance at the outpatient clinic. Various factors such as prolonged treatment in the unit and delay in outpatient appointments, explain the high proportion first seen after 14 days. Those cases first seen in 7 days or less, were, in many cases attending the clinic without undergoing any form of treatment elsewhere.

Signs and Symptoms

In Germany otorrhœa was the commonest symptom (98·6 per cent.), while pain was the complaint in only half the cases (52·9 per cent.).

In Cyprus aural pain (65 per cent.) was almost as common a presenting symptom as otorrhœa (72·5 per cent.); with this can be correlated the finding of inner-third meatal injection, an early physical sign not previously reported.

Pruritis and deafness were common symptoms in Germany (15·7 per cent. and 32·9 per cent.) and Cyprus (25 per cent. and 26·9 per cent.).

Extension of the meatal skin infection to the concha and pinna was present in less than 5 per cent. of cases in Germany and Cyprus. When present it was a useful confirmatory sign.

The skin at the junction of the concha and external auditory meatus was found to be readily traumatized by fingers and towels. Excoriation and fissuring in this region were found in Germany (11·4 per cent.) and Cyprus (22·5 per cent.).

Retro-auricular œdema with erection of the auricle was found in a small number of cases in Germany (8·6 per cent.) and Cyprus (17·5 per cent.). Once believed to be found only in mastoiditis, it is now well recognized as a complication of external otitis. In the present series it was found in conjunction with gross meatal œdema sufficient to occlude the external auditory canal.

Erythema of the external auditory meatus was widespread in Germany (37·1 per cent.) and Cyprus (38·8 per cent.). Toilet procedures were undoubtedly responsible in some cases. In Cyprus however, 43 cases (26·9 per cent.), showed an interesting sign of inner-third meatal injection—

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markedly tender—not involving the tympanic membrane or being associated with discharge. These cases complained solely of aural pain which was relieved by analgesics and in many cases required no local treatment.

Desquamated epithelial debris was present in Germany (25·7 per cent.) and Cyprus (28·8 per cent.). Meatal œdema approximating to stenosis with marked tenderness on examination was present in Cyprus (25 per cent.) and Germany (5·7 per cent.). This finding was in association with retro-auricular cellulitis.

Purulent aural discharge was present in a third of all cases, Germany 35·7 per cent., Cyprus 40·6 per cent. Many patients claiming to have aural discharge were found to have dry ears.

Palmer (1934) found that pain was the first symptom and that in many cases meatal œdema was a marked feature. Birrell (1945) reported that meatal injection was an early sign. Syverton *et al.* (1946) reported pain 52 per cent., discharge 47 per cent., pruritis 38 per cent., deafness 55 per cent., meatal erythema 100 per cent., œdema 78 per cent.

TABLE II.

Symptoms in Otitis Externa.

	Germany		Cyprus	
Aural pain	37	(52·9)	104	(65·0)
Irritation	11	(15·7)	40	(25·0)
Discharge	69	(98·6)	116	(72·5)
Deafness	23	(32·9)	43	(26·9)
Involvement of the pinna	2	(2·8)	7	(4·4)
Involvement of the concha	8	(11·4)	36	(22·5)
Retro-auricular cellulitis	6	(8·6)	28	(17·5)
Meatal injection—total	26	(37·1)	62	(38·8)
Meatal injection—inner third only			43	(26·9)
Epithelial debris	18	(25·7)	46	(28·8)
Meatal oedema	4	(5·7)	40	(25·0)
Purulent discharge	25	(35·7)	65	(40·6)

Treatment

Palmer (1934) employed syringing with dilute antiseptics. Morley (1938) recommended boro-spirit and carbo-glycerine. Friedman *et al.* (1941) employed X-ray therapy. Daggett (1942) reported good results following the use of silver nitrate and tannic acid. Collins (1943), Birrell (1945) and Jamieson (1946) employed ichthyol in glycerine. Kile *et al.* (1950) treated pyogenic skin infections with neomycin. Stewart (1951) employed an ointment containing streptomycin. Farrar (1954) reported on the use of Polymyxin B. while Bihari (1957) employed a mixture of hydrocortisone, neomycin and polymyxin.

All authorities agreed on the need for thorough but gentle meatal toilet, Daggett (1942) paying particular attention to the deep anterior meatal recess.

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Expectant treatment. In Germany 8 cases and in Cyprus 15 cases required no local treatment. The aural condition resolved in every case without recurrence.

Guttae S.V.R. (twice daily instillation). In Germany 32 cases were treated with instillation of S.V.R. drops. There were 13 cures and 10 failures.

In Cyprus 3 cases were treated and cured.

10 *per cent. Ichthyol in glycerine wicks* (daily insertion). In Germany this was used in 22 cases with 15 successes and four failures.

In Cyprus 26 cases were treated with 17 cures and 7 failures.

TABLE III.

RESULTS OF TREATMENT.

		0-7 days	8-14 days	15-21 days	22-28 days	Total	Failure	Unknown	Total
S.V.R.	Germany	7	5	1	—	13	10	9	32
	Cyprus	3	—	—	—	3	—	—	3
10% Ichthyol in glycerine	Germany	11	4	—	—	15	4	3	22
	Cyprus	10	2	3	2	17	7	2	26
Chloromycetin in propylene glycol ..	Germany	2	1	—	—	3	1	3	7
Chloromycetin in talc	Cyprus	3	3	2	—	8	2	—	10
Streptomycin in glycerine ..	Cyprus	9	6	1	—	16	6	2	24
Neomycin	Cyprus	15	6	1	—	22	3	—	25
Neomycin and Hydrocortisone ..	Cyprus	25	2	—	2	29	2	1	32
Silver nitrate ..	Cyprus	16	4	—	—	20	5	1	26
Nil	Germany	—	—	—	—	8	—	—	8
	Cyprus	—	—	—	—	15	—	—	15
						169	40	21	230

10 *per cent. Chloromycetin propylene glycol wicks* (daily insertion). In Germany 7 cases were treated with 3 cures and one failure.

2 *per cent. Chloromycetin in talc* (daily insufflation). In Cyprus 10 cases were treated with 8 successes and 2 failures.

10 *per cent. Streptomycin in glycerine wicks* (daily insertion). In Cyprus 24 cases were treated with 16 cures and 6 failures.

0·5 *per cent. Neomycin wicks* (daily insertion). In Cyprus 25 cases were treated with 22 cures and 3 failures.

0·5 *per cent. Neomycin and* 1 *per cent. Hydrocortisone wicks* (daily insertion. In Cyprus 32 cases were treated with 29 cures and 2 failures.

3 *per cent. Silver nitrate wicks* (daily insertion). In Cyprus 26 cases were treated with 20 cures and 5 failures.

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Results

Daggett (1942) reported 63 per cent. cured in 4 days, while Johnston (1944) cured his cases in 7-10 days. Senturia and Alford (1954) cured their cases in 1-7 days, while Birrell (1945) reported 2-14 days. Jamieson (1946) cured his cases in 16 days, while Dossetor (1957) took 5-11 days, and Bihari (1957) took 7 days.

In Germany and Cyprus it was found that in-patient treatment of otitis externa cured 60 per cent. of cases in 7 days (usually 3-4 days), while out-patient treatment had often to be prolonged for two to three weeks.

Recurrence

In Germany one recurrence took place in 14·3 per cent. of cases, two recurrences in 4·3 per cent.

In Cyprus one recurrence took place in 13·7 per cent. of cases, two recurrences in 2·5 per cent. and three recurrences in 1·7 per cent. of cases.

Birrell (1945) stated that recurrences were common. Dossetor (1957), found a 22 per cent. recurrence rate in his cases.

After Care

Wherever possible all cases were followed up regularly for three months.

Swimming was forbidden for one month.

Attention was drawn to measures outlined under prevention.

Prevention

This may well be summed up as consisting of keeping the ears dry, avoiding local trauma, maintaining a high standard of personal hygiene, and treating skin disorders.

(a) *Keeping the ears dry.* Washing should be carried out so as to avoid wetting the concha of the pinna. On no account should any attempt be made to wash the external auditory meatus.

Showers should be taken with care, either the head being held out of the shower or a rubber swim-cap being worn (covering the ears).

Swimming may be enjoyed but beaches should be examined to exclude the presence of faeces. A swim cap and ear plugs may be worn. Birrell (1945) condemned ear plugs, while Keogh and Russell (1946) recommended their use. Daggett (1942) advised postural drainage of the ears after swimming. On no account should any attempt be made to dry the ears.

Following otitis externa swimming should certainly be avoided for one month, preferably while the hot season lasts.

(b) *Avoiding local trauma.* On no account should a finger tip, towel corner or Kirby grip or any other object be placed in the external auditory canal.

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(c) *Personal hygiene.* Finger nails should be kept short and smooth and the nailfolds clean.

Double thickness toilet paper should be used in preference to single thickness and the hands carefully washed after use of the lavatory.

The hair should be regularly washed, but care taken to prevent water entering the ears.

(d) *Skin infection.* Keogh and Russell (1956) recommended the treatment of all existing skin disorders especially paronychia, furunculosis, nasal vestibulitis and ano-genital infections.

Summary

Two hundred and thirty cases of otitis externa were investigated, seventy in Germany and one hundred and sixty in Cyprus, over a period of thirty months.

Staphylococcus aureus proved to be the most common infecting organism in Germany, while *Pseudomonas pyocyaneus* predominated in Cyprus. In both countries a significant number of cases possessed a similar staphylococcal infection of the nailfolds and nasal vestibules. An association was revealed between finger nail neglect and otitis externa. Skin disorders and dandruff were present in one third of cases. Hair washing was performed frequently but in an unsatisfactory manner.

Swimming, as an ætiological factor in otitis externa, was supported by the findings in Cyprus. A source of fæcal contamination was observed.

Over 40 per cent. of cases of otitis externa occurred within six months of arrival in the country. A high proportion of cases had a history of previous attacks.

A seasonal variation in the incidence of otitis externa, although but little marked in Germany, was a notable feature in Cyprus where it was closely associated with meteorological variations.

The incidence of clinical features was noted. Attention is drawn to inner-third meatal injection as an early physical sign of the disorder.

Treatment cured 60 per cent. of patients in 7 days or less, the results being obtained more quickly with in-patients. Recurrence took place in less than 15 per cent. of all cases. Neomycin and hydrocortisone ointment proved of great value.

Prevention included advice on keeping the ears dry, avoiding local trauma and maintaining a high standard of personal hygiene.

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