

EPIDEMIOLOGICAL ASPECTS OF HUMAN TRICHOMONIASIS*†

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INTRODUCTION

Trichomonads belong to the phylum *protozoa* (unicellular or acellular animals—the latter term being preferred for the more specialized protozoa); they are flagellated (class: *mastigophora*), animal-like without chlorophyll (order: *zoomastigina*), and of the sub-order *polymastigina*—which comprises such protozoa which are mono-, di-, or multinucleate, with three to eight flagella per nucleus and without pseudopodia. The *trichomonadidae* family are mono-nucleate with an axial organelle and an undulating membrane. The genus *Trichomonas* comprises those with three to four anterior flagella and another posteriorly which forms the undulating membrane.

Trichomonads are very widespread throughout nature. There is almost no limit to their known natural hosts, which include insects like termites and crickets; fish (*e.g.* the mullet); reptiles, as the snail; the leech; many varieties of snakes; lizards; frogs; toads, newts, and salamanders; crocodile, tortoise, and terrapin; many different birds, including the night-jar, woodchuck, sandpiper, cuckoo, crow, hawk, eagle, owl, blue jay, parrot, parrakeet, canary, swan, pea-fowl, duck, goose, moorhen, pigeon, grouse, chicken, guinea-fowl, quail, pheasant, turkey, peacock, and pelican; and a variety of mammals including the mouse, rat, guinea-pig, hamster, opossum, rabbit, fox, mongoose, jackal, deer, tapir, kangaroo, ant-eater, pig, goat, sheep, cow, ox, ass, horse, cat, dog, monkeys, apes, and man (Trussell, 1947; Hall, 1953).

Most of these various trichomonads are saprophytic: some assist in essential biological processes in the host and some are pathogenic. The most important of the latter are *Trichomonas gallinae* which

affects the anterior digestive tract of pigeons (and on which account pigeon fanciers may sometimes have to sacrifice their prize birds); *Trichomonas gallinorum* which infests the ceca of chickens and turkeys and the liver of turkeys (and which with another protozoon—*Histomonas melagradis*—is associated with “blackhead disease” in poultry); and *Trichomonas foetus*, which affects the genital tract of cattle. The latter, a trichomonad with three flagella, may cause a balanitis in bulls, and pyometra, abortion, and sterility in cows. Although it is estimated to affect less than 0.5 per cent. of cattle, beasts have on occasion had to be slaughtered because of it. The possible theoretical implications as regards man of an animal genital trichomonad acting in this way are obvious.

The most important trichomonad infesting man is *Trichomonas vaginalis* (synonyms: *T. vaginale*, *T. vaginae*, *T. irregularis*, *T. vulvo-vaginalis*). This organism was named *Trichomonas vaginale* by Donné, who first described it in 1836, the name *Trichomonas vaginalis* being given to it by Ehrenberg (1838). Other organisms are *Trichomonas buccalis* (synonyms: *T. tenax*, *T. elongata*, *T. candida*, *T. biflagellata*, *T. pulmonalis*), which may be found in the mouth; *T. hominis* (synonyms: *T. intestinalis*, *T. confusa*, *T. dysenteriae*, *Cinaenomonas hominis*, *Cercomonas coli hominis*, *Entamoeba undulans*), *Trichomonas ardin delteili* (a pentatrachomonad with five flagella), and *Trichomonas faecalis*, which are all three found in the bowel. Not all are agreed as to the separate identities of the bowel trichomonads. Only *T. vaginalis* is of real clinical importance.

The majority, but not all workers—*e.g.* Mascall (1954)—are agreed that the trichomonads affecting man are separate species. There are a number of differences including morphology. *T. vaginalis*, for example, has four anterior flagella, the undulating membrane extends for only two-thirds of the length of the body, and there is no trailing flagellum. *T.*

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hominis, however, often has five anterior flagella (as has *Pentatrichomonas ardin delteili*) and there is a trailing posterior flagellum; *T. buccalis* resembles *T. vaginalis* as regards its flagella and undulating membrane but is smaller in size.

Those who consider that the various human trichomonads are of the same species suggest that:

- (a) even in the same site, morphological differences such as size and morphology may be encountered;
- (b) such differences are fostered by the environment (*i.e.* they wax fat in the vagina because of the better food supply).

Viability also differs. *T. vaginalis* will survive but will not multiply at room temperatures, while the others will do both. *T. hominis* can survive in media without serum, but not the others. *T. vaginalis* will live for only half an hour in faeces, while *T. buccalis* and *T. hominis* will survive for 7 and 24 hrs respectively (Trussell, 1947). In addition, serological reactions, using agglutination and complement-fixation reactions and fluorescein-tagged antibody techniques, can be devised to shew differences, although there is a considerable degree of overlap in these.

Also, while *T. hominis* can infect cats, rats, mice, etc., in addition to man, *T. vaginalis* will produce only an asymptomatic infestation of monkeys—Johnson, Kupferberg, Hartman, and Raritan (1950)*. Moreover, while *T. vaginalis* may be successfully inoculated into the vagina of women, *T. hominis* and *T. buccalis* have only been able to survive for periods of hours to days (Trussell, 1947). Basic work of this nature is difficult to undertake and more data are required before the results can be considered to be entirely convincing. As pointed out by Buxton, Weinman, and Johnson (1958), female prisoners would be the most promising source of volunteers but they are unfortunately frequently infected in the first place.

Finally, inoculation experiments also favour the individuality of the different trichomonads. Westphal (1936), for example, studied his own stools and saliva and found no trichomonads over a 3-year period. He inoculated his mouth and swallowed *T. vaginalis*, without establishing the parasite in either site. He then swallowed *T. buccalis* and it did not survive in the bowel, although he successfully established the trichomonad in his mouth for a period of 10 months. Finally, he swallowed *T. hominis* and recovered same from his stools over a period of from 3 days to 5 months.

* Apart from specialized laboratory techniques such as intra-peritoneal injections into mice (*Lab. World*, 1958).

INCIDENCE OF TRICHOMONADS IN MAN

(a) *T. vaginalis*

Figures of the incidence of *T. vaginalis* in women shew fairly wide variations, partly because of differences in diagnostic techniques, but more often because of varied and selected population groups. Obviously higher rates of infestation are to be expected in women attending venereal disease and gynaecological clinics, because the presence of a vaginal discharge may have prompted their attendance, than in women examined in random checks of unselected population groups. Figures for the latter, by the nature of the examination required, are relatively hard to obtain. Even data from, for example, a cancer survey tend to be biased, as the presence of a discharge might have had an associated fear of cancer which prompted the voluntary submission to examination. Trussell (1947) has estimated that, in the U.S.A., 20 to 25 per cent of women may carry the parasite, and Kean (1955) has estimated 20 to 30 per cent. Some reported figures of incidence are shown in Table I.

TABLE I
INCIDENCE OF *T. VAGINALIS*

Population Group	Source		No. Tested	Percentage Positive
	Authors	Date		
V.D. Patients	Mascall	1954	600	45.6
	St. Mary's Hospital	1960	126	39.7
Obstetric and Gynaecological Patients	Kean and others	1954	100 100	26 15
	Burch and others	1959	469	46.5
	Buxton and others	1958	575	6.9
Cancer Survey	Kean and others	1954	300	13.0
	Burch and others	1959	1,848	17.7
U.S. Medical Clinic . .	Feo	1956	504	12.9
U.S. Insurance Company . .	Buxton and others	1958	465	M. 6.3 S. 1.4
Chinese Cotton Mill	Wang and Hsia . .	1958	1,460	31.3
Africans (Belgian Congo)	Verheye and Kanda	1958	912	14.0

The infestation has generally been assumed to be most prevalent during the sexually active period of life, but, as many of the figures are compiled from venereal disease, gynaecological, and obstetric clinics dealing with sexually active persons, there is already a bias in the material. Of 500 cases presented by Kean,

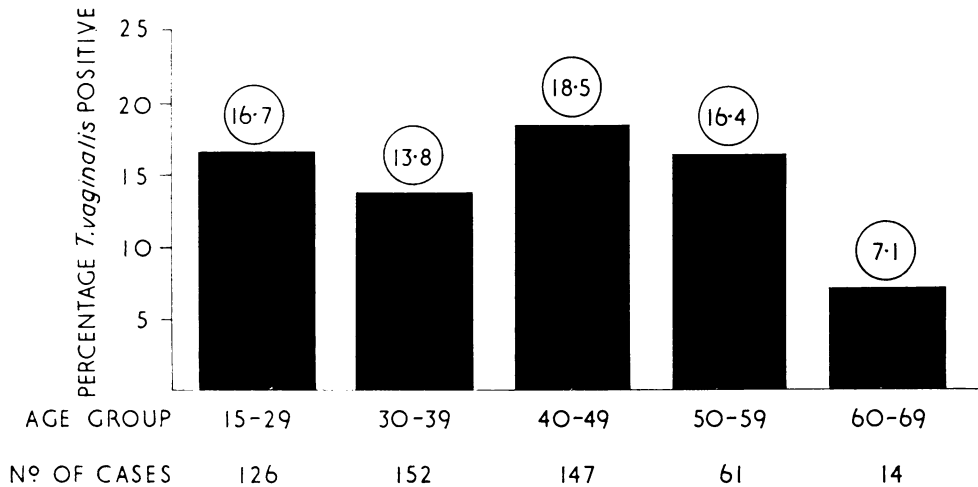


FIG. 1.—Percentage incidence of *T. vaginalis* by age group in 500 female patients in New York (after Kean and others, 1954).

Day, and Wolinska (1954), the percentage incidence by age group was spread out fairly evenly between 15 and 60 years (Fig. 1). Moreover, the condition—contrary to some authors—may be encountered before the menarche (Kleegman, 1955), and certainly after the menopause. Kean and others (1954) found the parasite in eleven (14.7 per cent.) of 76 women over 50 years of age. Feo (1956) examined 504 menopausal patients in a medical clinic (Fig. 2) and found the parasite in 65 (12.9 per cent.).

When these patients were analysed by race and age group, only two (0.9 per cent.) out of 227 white women aged 60 and over were found to be infected, and both were asymptomatic, as compared with 22 (20.8 per cent.) out of 106 Negro women aged 60 and over, nine of whom were asymptomatic (Fig. 2).

The vaginal trichomonad is found more commonly in pregnant than in non-pregnant women; according to Trussell (1947), *T. vaginalis* was found in 28.9 per cent. of 433 pregnant women and in only 17.9 per cent. of 703 non-pregnant women.

The parasite has been reported far more commonly in Negroes than in others. In five series, giving a total of 4,382 white women (quoted by Trussell, 1947), *T. vaginalis* was found in 1,027 (23.5 per cent.) whereas in 2,559 coloured women in the same five series, *T. vaginalis* was found in 1,156 (45.2 per cent.). Burch, Rees, and Reardon (1959) found the parasite in 60.9 per cent. of 335 coloured patients, as compared with only 8.1 per cent. of 1,513 white patients. In random samples of 912 Africans in the Belgian Congo, however, Verheye and Kanda (1958) found trichomonads in only 128 (14 per cent.); they were present in 51.2 per cent. of those with a vaginal discharge and in only 3 per cent. of those without a discharge.

Serological tests by cross agglutination (Lanceley, 1958) and by fluorescein-

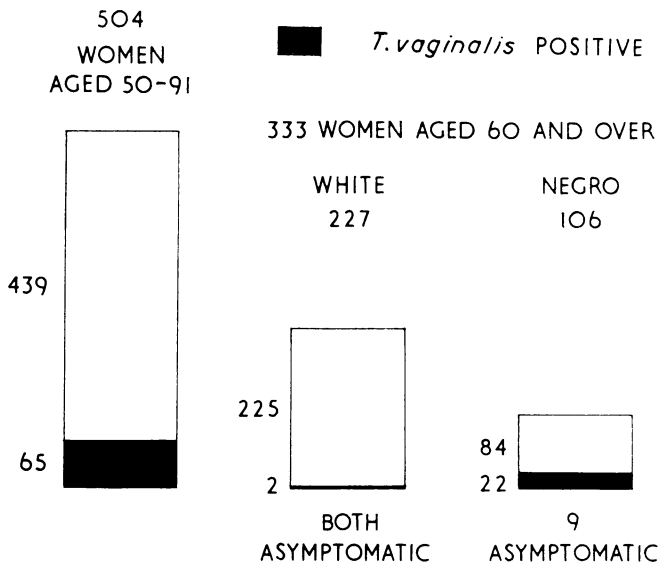


FIG. 2.—Incidence of *T. vaginalis* in menopausal patients (after Feo, 1956).

tagged antibody techniques (McEntegart, Chadwick, and Nairn, 1958) suggest that differing strains of *T. vaginalis* may exist in man.

(b) *T. hominis*

The bowel trichomonad has a very much lower incidence than *T. vaginalis* and is more commonly found in patients with gastro-enteric disease *e.g.* dysentery. According to Trussell (1947), in 6,474 routine examinations *T. hominis* was found only on 25 occasions (0.4 per cent.), while it was encountered in 437 (3.5 per cent.) of 12,631 patients with gastro-enteric disease. Moreover, there was little association between its presence and that of *T. vaginalis*. Of 200 largely selected women examined by Liston and Liston (1939), *T. vaginalis* was found in 98. An intestinal trichomonad (identified as *Pentatrichomonas ardin delteiti*) was found only in one patient, who did not harbour *T. vaginalis*. Of 200 patients examined by Bland and Rakoff (1937), *T. vaginalis* was found in 47 and *T. hominis* in three, both protozoa being found in only one woman. These findings are against the theory that trichomonas vaginitis may arise from trichomoniasis in the bowel.

(c) *T. buccalis*

This is found in the mouth in only approximately 5 per cent. of patients with *T. vaginalis*, although higher figures may be reported (Table II).

TABLE II
T. BUCCALIS AND *T. VAGINALIS*

Source		Patients with <i>T. vaginalis</i>	Patients with <i>T. buccalis</i>	Percentage with <i>T. buccalis</i>
Authors	Date			
Liston and Liston	1939	98	5	5.1
Stein and Cope	1933	58	3	5.2
Bland and Rakoff	1937	47	9	19.1

In the series of 200 women reported by Liston and Liston (1939), *T. buccalis* was found in only six, five of whom also had vaginal infestation (98 in whole series), and none of these shewed infestation of the bowel. In the series of 200 women reported by Bland and Rakoff (1937), no less than 33 had infection with *T. buccalis*. Only nine, however, had vaginal and oral trichomonads, only one had vaginal and intestinal, and only one had oral and intestinal trichomonads. This evidence, therefore, is also against any direct association between trichomonads found in the vagina, mouth, or intestine.

TRANSMISSION OF *T. VAGINALIS*

(1) *By Venereal Means*

In recent years two symposia on human trichomoniasis have been held, one at Rheims, France, in 1957, and the other at Montreal, Canada, in 1959. At both, the consensus of opinion was that the condition is usually transmitted venereally.

Certainly *T. vaginalis* may be found in some cases of non-gonococcal urethritis, may linger in the prostate for long periods of time, and may be ejected in the semen (Whittington, 1951). It may also be found in the sub-preputial sac and be associated with a balanitis. Examinations of the male consorts of female sufferers have shewn a wide variation of positive findings, although such statistics may be biased, insofar that those with symptoms rather than those without are more likely to volunteer for examination (Table III). The sizes of the published series are small and are often inflated by the inclusion of cases in which *T. vaginalis* is first found in a male with non-gonococcal urethritis. It would be unwise to extend the positivity rates to the population at large.

TABLE III
T. VAGINALIS IN MALE CONSORTS

Source		No. of Male Consorts Examined	Percentage Positive
Authors	Date		
Mascall	1954	150	4.0
Bernstine and Rakoff .. .	1953	60	6.6
Karnaky	1957	150	25.3
Whittington	1951	291	30.2
Burch and others	1959	31	41.9
Verhey and Kanda	1958	128	47.0

The incidence of *T. vaginalis* in the urethral discharge of males with non-gonococcal urethritis varies widely according to different authors in different parts of the world. Durel and Roiron (1959) reported that in the literature, figures between 1 and 73 per cent. have been quoted. Again, in the male, the highest figures (*e.g.* such as that given by Feo in Philadelphia) are found in the Negro groups. Moreover, it has been shewn by Lanceley and McEntegart (1953) that the experimental inoculation of *T. vaginalis* into the male urethra results in a urethritis from the discharge of which the parasite may be recovered. The implications of *T. vaginalis* infestation of the male as an explanation of the high apparent "relapse" rates following treatment in the female are obvious.

Catterall and Nicol (1960) had 56 male patients with *T. vaginalis* urethritis whose female consorts were available for examination. All (100 per cent.) had *T. vaginalis* vaginitis, a figure well above the approximately 40 per cent. infestation rate in venereal disease clinic patients as a whole.

This then is the evidence on which the theory of venereal transmission is based. It has, however, certain weaknesses. Granted that the parasite may be found in, say conservatively, 10 per cent. of females between 15 and 54 years of age (ignoring those which may occur beyond these extremes), there are some 1,290,000 women in England and Wales who may be harbouring the organism. On the other hand, in 1958, 17,606 cases of non-gonococcal urethritis were reported in the venereal disease clinics in 1958 (Ministry of Health, 1959). Even allowing for a possible 40 per cent. addition (this is double the figure calculated in an estimate made by the British Medical Association and British Cooperative Clinical Group, 1959) for those cases treated in private practice, and for increases which may have taken place since—the total number can scarcely exceed 26,000.

Most British venereologists will agree that they cannot find trichomonads in more than 5 per cent. of their cases of non-gonococcal urethritis. This gives a probable total of 1,300 cases of trichomonal urethritis, compared with an estimate of nearly 13 million infected women—a disproportion of 1,000 to one!

Some other reasons than excessive promiscuity amongst the female population have to be sought to explain this disparity. These include:

- (a) The infection is asymptomatic in the male. This is known to be so. Indeed, many of the consorts of women with trichomonas vaginitis have no symptoms, although they may be found to have a mild discharge, shreds in their urine, and pus in the prostatic secretion on examination. However, in British venereal disease clinics, approximately 40 per cent. of female patients have *T. vaginalis*, yet the incidence in white males with non-gonococcal urethritis is less than 5 per cent.
- (b) To account for this it has to be postulated that present diagnostic methods are inadequate. Certainly cultural methods will improve on wet-smear diagnosis—but only slightly and not sufficiently to suggest that a very significant proportion of cases is missed if cultures are not used;

- (c) This necessitates the postulate that the organism assumes a resting stage which cannot be cultured by ordinary means and is not easily recognized in the smears. Although many have suggested this, there is no firm opinion that such a development does occur, although agonal rounded forms may be observed in cultures, and it still remains a possibility;
- (d) The infection, once established, persists for long periods in the female and is of short duration in the male. This may well be the case, but there is an absence of basic data to confirm it and fundamental research is required. The exact natural duration of infection in both sexes is not precisely known. The condition is often stated to be self-limiting in the male but cases are often encountered where the parasite is known to persist for months or years and is extremely difficult to eradicate. It is possible that the parasite may be carried for short periods in the male preputial sac from which it is removed during routine hygiene, whereas such cannot occur in the woman;
- (e) In addition to the sexual act, other indirect methods of transmission play an important part.

(2) Indirect Methods of Transmission

Theories that vaginal infestation may arise from the bowel would appear to be incorrect as far as *T. hominis* is concerned. The available evidence would appear to indicate that *T. vaginalis* and the intestinal trichomonads are separate species—although not everyone is agreed that the evidence is conclusive (e.g. Mascall, 1954). This author has suggested that the parasite might be ingested in the food (flies being partially responsible for the spread) and vaginal infection initiated by wiping the anus from behind forwards. No evidence, however, has so far been produced which strongly supports this theory.

Some have suggested that the infestation may arise from domestic animal sources but the available evidence is against this.

Another possibility is that the infection is distributed by water during bathing. Bath water is an unlikely source as (a) it is relatively infrequently shared by adults, and (b) soap is actively trichomonocidal. Swimming baths have received attention, but the parasite has been shewn as unlikely to survive for long in the degree of chlorination found in the average swimming bath (Weiler, 1938). Intestinal trichomonads have been shewn to survive for varying periods in fresh river water (Ying Wu, 1938), but the

number of the female population, certainly in Great Britain and in Northern Europe who bathe regularly in fresh water, is small in relation to the numbers of known infections and such a method of transmission cannot be significant.

There remain inanimate objects: towels, water closet seats, douche nozzles, etc. The medical practitioner's speculum has even been suggested, but such seems unlikely except as an occasional possibility. Douche nozzles must be infrequently shared. The most likely are water closet seats and towels.

McCullagh (1953) favoured the seat as a frequent means of transmission. Certainly *T. vaginalis* will remain alive as long as it is contained in moist secretions; like most organisms it dislikes drying. Kessel and Thompson (1950) shewed that *T. vaginalis* would survive up to 6 hours when vaginal exudate was dried on enamelled blocks of wood. In experiments at the London Hospital, Whittington (1957) shewed that *T. vaginalis* would survive for 45 minutes in urine on a bakelite or polished wood water closet seat, and for 30 minutes at room temperatures on unpolished wood. An ingenious contraption was fitted to a water-closet in the outpatient department, whereby, unknown to the user, a bell rang outside if the seat was sat upon. Approximately one half of its female users (17 out of 30) proved to be sitters and one half non-sitters. Obviously, therefore, it is possible for a non-sitter to deposit urine containing trichomonads on the seat (where they will survive for 45 minutes), and for a sitter to transfer them to the genitalia.

Evidence regarding towels is even more impressive. Burch and others (1959) made cultures of a damp cloth which had been used to clean the genitalia of 38 women with vaginal trichomoniasis; their findings are summarized in Table IV. Of 155 tests made up to 25 hours after use, *T. vaginalis* was cultured in 53 (34.2 per cent.). Of 103 tests made within 3 hours of use, the parasite was cultured in 45.

TABLE IV
TRANSMISSION OF *T. VAGINALIS* BY TOWELS
(Burch and others, 1959)
Cultures of a damp cloth used to clean the genitalia of 38 women

Hours before Cloth was Cultured	No. of Tests	Positive	
		No.	Per cent.
0-1	23	14	60.9
1-3	80	31	38.8
3-6	22	5	22.7
6-8	11	2	18.2
18-24	19	1	5.3
Totals	155	53	34.2

It would be expected that indirect transmission would be more likely to occur in over-crowded, unhygienic conditions in which personal habits are less fastidious. Some support for this idea would be found in differing incidences of infection in different social groups. It could certainly account for the known differences between white persons and Negroes, the latter frequently being of a lower socio-economic status in the community—although the comparative incidence of venereal disease shows that they are also often the more promiscuous.

The figures given by Buxton and others (1958) are of interest (Fig. 3, opposite). *T. vaginalis* was found in no less than 70 per cent. of 221 female prisoners. These women had been in prison for periods of from 6 weeks to many years and many had been promiscuous.

Of 715 females aged 16 to 89 years who were inmates in a mental institution, *T. vaginalis* was found in 15 per cent. Although 304 of these women had been inmates for less than 5 years, the remainder had been detained for 5 years or more and opportunities for sexual exposure must have been virtually absent. No difference in incidence was found in these two groups.

The parasite was found in only 6.9 per cent. of 575 obstetric and gynaecological patients.

For comparison, tests were made on persons belonging to better socio-economic groups. Of 465 employees of an insurance company, *T. vaginalis* was found in only 1.3 per cent. of single women and in 6.3 per cent. of married women. Finally, 157 female undergraduates aged 20 to 22 years were examined, only ten of whom were married, and trichomonads were recovered from none.

(3) Conditioning Factors

Finally, there are conditioning factors, such as local trauma and infection with other organisms, e.g. streptococci. At one time the theory was advanced that the vaginitis was due to a streptococcus and that the trichomonad was merely a saprophyte which flourished in the discharge. Its association with a Grade III vaginal flora was considered not to be one of cause and effect, (i.e. produced by the parasite, but rather as pre-existing and favouring its establishment). The evidence is now sufficient to adduce that *T. vaginalis* is a pathogen. However, it has been shewn in inoculation experiments that experimental inoculations are more successful with a natural or contaminated inoculum than when pure cultures are used. In figures compiled from Trussell

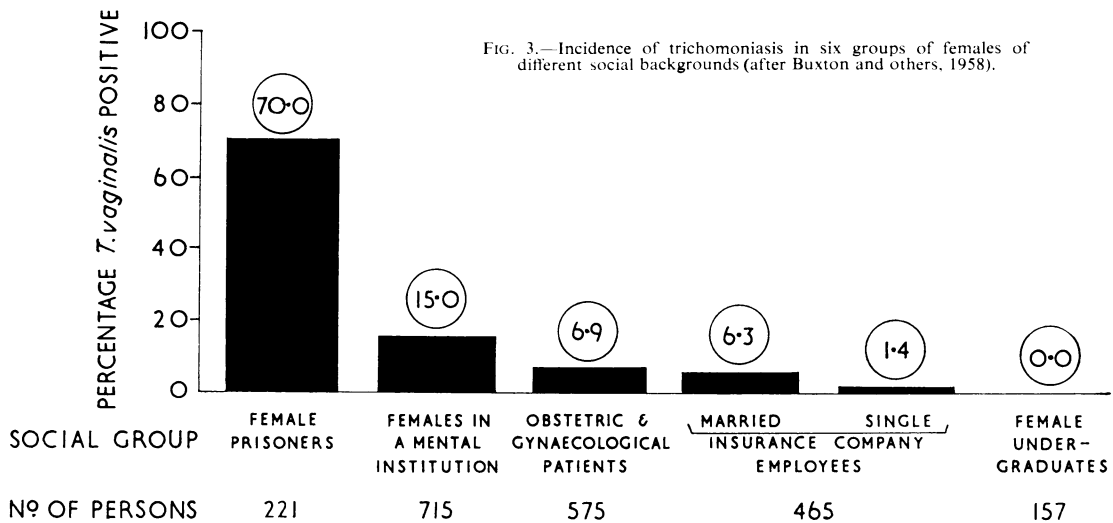


FIG. 3.—Incidence of trichomoniasis in six groups of females of different social backgrounds (after Buxton and others, 1958).

(1947), there were sixteen takes (19.5 per cent.) in 82 inoculations with a non-contaminated inoculum, compared with 44 takes out of 56 (78.6 per cent.) when a contaminated inoculum was used. Where hygiene is poor, there is a greater likelihood of finding secondary pathogenic organisms in the genitalia of both sexes.

Another interesting observation made by Burch and others (1959) was an apparent religious difference in incidence. *T. vaginalis* was recovered in 101 (9.5 per cent.) of 1,059 Protestant women, but in only 4.3 per cent. of 350 Catholic women. Trauma, occasioned by the more frequent use of contraceptives by the first group, making establishment of *T. vaginalis* in the vagina more likely, might explain this apparent difference in incidence.

Finally, psychological factors must not be forgotten. Some authors, e.g. Moore and Simpson (1954) and McEwen (1959), have suggested that an emotional upset acting through the hormones may alter the vaginal epithelium so that it is receptive for *T. vaginalis*. Emotional upset is often found in affected patients, but this may well be a result and not the cause of the condition.

SUMMARY AND CONCLUSIONS

(1) The widespread distribution of trichomonads in nature is indicated. In man may be found *T. vaginalis* and *T. buccalis*, and intestinal trichomonads, including *T. hominis*.

(2) The individuality of the various human trichomonads is considered. The evidence suggests that the species are separate. So many trichomonads exist in

nature that it is illogical to believe that only one form exists in man—unless many of those which infest the animal kingdom can be shewn to be the same.

(3) The incidence of *T. vaginalis* infestation in women is considered. The parasite is found more commonly in patients with venereal disease and in gynaecological patients than in the population at large, more in coloured than in white women, and more in pregnant rather than in non-pregnant women. True figures of actual incidence vary, but 10–25 per cent or more of the sexually-active female population of various countries appear to be affected. The condition may sometimes be found before the menarche and after the menopause.

(4) The incidence of infestation with *T. hominis* is much lower, reaching 3.5 per cent. in persons with gastro-enteric disease. Infestation with *T. hominis* or with *T. buccalis* bears no relation to infestation with the vaginal parasite. *T. buccalis* is found in only approximately 5 per cent. of persons harbouring the vaginal organism.

(5) The consensus of present-day opinion is that *T. vaginalis* is usually transmitted venereally. The evidence for this, the most important being the high rate of infestation of the urethra and/or prostate in the male consorts of female cases of vaginal trichomoniasis and its presence in some male cases of non-gonococcal urethritis, is examined critically.

(6) On the basis of a suggested 10 per cent. infestation rate, it is estimated that approximately 1.3 million women between 15 and 54 years of age are harbouring the parasite in England and Wales.

Of an estimated annual total of probably less than 26,000 cases of non-gonococcal urethritis (from which *T. vaginalis* can be recovered in approximately 5 per cent. or less), there are estimated to be only 1,250 or less of demonstrable cases of trichomoniasis in males, a disproportion of 1,000 to one. This may indicate that other means of transmission may operate in addition.

(7) The possible agents of indirect transmission of *T. vaginalis* are reviewed. The most likely would appear to be towels and water closet seats. Overcrowded conditions, where hygienic standards are poor, would appear to favour this type of transmission, and the comparative incidence in population groups of varying socio-economic status lends some support to this theory.

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Aspects épidémiologiques des trichomoniasis humaines

Résumé et conclusions

(1) On indique que les trichomonades sont très répandus dans la nature. Chez l'homme on trouve le *T. vaginalis* et le *T. buccalis* et des trichomonades intestinaux, y compris le *T. hominis*.

(2) On considère l'individualité de différents trichomonades humains. Plusieurs faits indiquent qu'ils appartiennent à un espèce différent. Il y a tant de trichomonades dans la nature, qu'il ne serait pas logique de croire qu'une seule forme existe chez l'homme—à moins qu'on puisse prouver que beaucoup de ceux qui infestent le règne animal soient identiques.

(3) On considère la fréquence de l'infestation des femmes par le *T. vaginalis*. On trouve ce parasite plus souvent chez des malades vénériennes et gynécologiques que dans la population générale, chez des femmes de couleur que chez celles de race blanche, et chez les enceintes plutôt que chez les autres. Les chiffres corrects de la vraie fréquence sont variables, mais 10 à 25 pour cent ou plus de la population féminine sexuellement active de divers pays semblent être affectés. Quelquefois on trouve cette condition avant la puberté et après la ménopause.

(4) La fréquence de l'infestation par le *T. hominis* est beaucoup plus basse, atteignant 3,5 pour cent chez des personnes souffrant d'une maladie gastro-intestinale. L'infestation par le *T. hominis* ou le *T. buccalis* n'a rien à faire avec l'infestation par le parasite vaginal. On ne trouve le *T. buccalis* qu'en 5 pour cent des personnes hébergeant le monade vaginal.

(5) L'opinion actuelle s'accorde sur le fait que le *T. vaginalis* est habituellement transmis par voie vénérienne. On examine ici critiquement les preuves à l'appui de cette opinion; parmi les preuves le plus importantes on cite une grande fréquence d'infestation de l'urètre et/ou de la prostate des époux des femmes atteintes de vaginite à trichomonas et la présence de ces trichomonades chez certains hommes atteints d'urétrite non-gonococcique.

(6) A la base d'un taux d'infestation estimé à 10 pour cent, on croit qu'en Angleterre et au Pays de Galles, près de 1,3 millions de femmes âgées de 15 à 54 ans hébergent ce parasite. On estime que le nombre total par an des cas d'urétrite non-gonococcique mâle est probablement en dessous de 26.000 (et on n'y trouve le *T. vaginalis* qu'en 5 pour cent des cas), il n'y aurait donc, tout au plus, 1.250 cas prouvés d'infection à trichomonas chez le mâle—une disproportion de 1.000 : 1. Ceci peut bien indiquer qu'il y aurait d'autres voies de transmission.

(7) On considère les agents possibles de transmission indirecte du *T. vaginalis*. Parmi les plus probables on cite la serviette et le siège du water closet. Le surpeuplement et les conditions d'hygiène mauvaises, semblent favoriser ce genre de transmission, et sa fréquence variable selon le groupe socio-économique vient à l'appui de cette théorie.