

Organisms of the Tribe Mimeae

An Evaluation of 53 Cases with Pure Culture Isolations

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SINCE the description of the microorganisms of the tribe Mimeae, by DeBord¹ in 1942, several cases have been reported in literature in which these organisms have been isolated in pure culture from patients with various disease processes. These include vaginitis,¹ septicemia,² acute bacterial endocarditis,³ subacute bacterial endocarditis,⁴ Waterhouse-Friderichsen syndrome,⁵ meningitis,⁶ conjunctivitis,¹ acute synovitis,⁷ chronic synovitis,⁸ urethritis,^{9, 10} and from the spinal fluid of a patient with an injury to his head.¹¹ There has been an increased frequency with which our laboratory has been isolating organisms of the tribe Mimeae. The authors made a survey of all cases in which these organisms were isolated in pure culture at Freedmen's Hospital during the years 1951 through 1959 in hopes of correlating the pathogenic nature of these organisms with the signs and symptoms presented by the patients.

MATERIALS AND METHODS

All specimens submitted for bacteriologic examination, were inoculated on or into one or more

of the following media: blood agar, eosin methylene blue agar, Mac Conkey's agar, Salmonella-Shigella agar, Chocolate agar, thioglycollate broth, trypticase soy broth and selenite F enrichment broth. All cultures were incubated at 37°C. aerobically, anaerobically or in candle jar. Andrade or bromthymol blue indicators in nutrient broth base with 1 per cent of the various carbohydrates were used for aerobic fermentations. In vitro sensitivity studies were performed by the serial dilution method or by the use of commercial antibiotic discs. Confirmatory tests, including serologic tests, were performed on many of the organisms by the USPHS, Chamblee, Georgia.

RESULTS

During the period of study, organisms of tribe Mimeae were isolated in 235 cases. Of these, 53 were isolated in pure culture from many body fluids, Table 1. *Herellea* species and *Mima* species were isolated in pure culture in 36 and 17 instances respectively. All of the remaining were mixed cultures and are excluded from this study. The cases

TABLE 1.—SOURCES OF ORGANISMS WITH NUMBER ISOLATED IN PURE AND MIXED CULTURES

Sources	<i>Herellea</i> Species		<i>Mima</i> Species		Total
	Mixed	Pure	Mixed	Pure	
Urine	37	15	9	7	68
Bronchial ¹					
Secretions & Sputa	74	1	10	0	85
Pus ²	36	5	1	1	43
Blood ³	6	10	1	7	24
Spinal Fluid ⁴	0	2	1	1	4
Urethral (genital)	2	1	0	2	5
Stools	4	0	0	0	4
Synovial	0	1	0	0	1
Unknown Source	1	0	0	0	1
Total	160	35	22	18	235

1. Two cases from autopsy
2. Two cases from autopsy

3. Four cases from autopsy
Two cases from donor blood
4. One case from autopsy

were studied with emphasis being placed on the association of clinical symptoms and signs, the isolation of the organisms in pure culture and the disappearance of symptoms and signs following specific antibiotic therapy. A study of the cultural and biochemical characteristics of the organisms as well as their response to antibiotics was noted, Tables 2 and 3.

CASE STUDIES

Pure Cultures From Urine: There were 22 patients comprising this group. They ranged in age from 2 to 74 years. Female patients slightly outnumbered the male patients. In 18 cases, the major symptoms were frequency and dysuria. Slight to moderate tenderness was noted over the bladder area or over one or both kidney areas. Approximately 50 per cent of this group experienced slight temperature elevations. Microscopic urinalysis showed that the white blood cells numbered from 5-6/HPF to overloaded. The remaining four cases were not adequately documented. On one of these, there were no symptoms or signs of a urinary tract infection, however, the urine culture was positive. The other three, however, did have a few vague symptoms referable to the urinary system but the microscopic urinalyses were negative for white cells. In all 22 cases, appropriate antibiotics were used and the symptoms and signs disappeared in the 18 patients with symptoms. The urine cultures on all cases became negative after three repeat examinations.

TABLE 2.—BIOCHEMICAL REACTIONS

	<i>Herellea</i>	<i>Mima</i>
Glucose	A	O
Lactose	O	O
Sucrose	O	O
Maltose	O	O
Mannital	O	O
Salicin	O	O
Xylose	A	O
10% Lactose		
Agar	A (Slant)	O
Citrate	†	O
H ₂ S	O	O
Urease	O	O
Indole	O	O
Oxidase	O	‡
Methyl Red	O	O
Voges		
Proskauer	O	O
Motility	O	O
Motility	O	O
Nitrate	O	O
Pigment	O	O
Hemolysis	‡	‡
TSI	No	No
	Change	Change
SS	No	No
	Growth	Growth

A — Acid
O — No reaction
† — Positive

‡ — Variable
NC — No Change
NG — No growth

Pure Cultures From Pus: In six cases, the organisms were isolated in pure culture from pus. The sources of the pus were, an ischioanal abscess, an

TABLE 3.—ANTIBIOTIC SENSITIVITIES AND RESISTANCE TO VARIOUS ANTIBIOTICS BOTH PURE AND MIXED CULTURES

Antibiotic	<i>Herellea</i>		Total Tested	<i>Mima</i>		Total Tested
	Sensitive	Resistant		Sensitive	Resistant	
Penicillin	1	42	43	2	12	14
Streptomycin	24	34	58	5	11	16
Chloromycetin	19	39	58	11	4	15
Erythromycin	23	16	39	8	3	11
Terramycin	36	26	62	13	5	18
Tetracycline	27	25	52	10	4	14
Aeuromycin	34	29	63	16	3	19
Triple Sulfa	14	20	34	4	7	11
Albamycin	17	7	24	3	0	3
Furadantin	12	17	29	6	0	6
Gantrisin	7	12	19	1	2	3
Polymyxin	0	3	3			
Neomycin	8	2	10	3	1	4
Matromycin	1	2	5	2	0	2

ulcer of the chest and two abscesses of the upper extremities in two different persons. These lesions were treated with specific antibiotics and surgical incision and drainage of the abscesses. These lesions were healed within an average of five to eight days.

The other two cases were autopsy cases. The first was that of a young adult male with headache, high fever, somnolence and occasional generalized tremors. He died in coma before a spinal tap and specific therapy were instituted. Autopsy showed a fluctuant mass of the right frontal lobe which measured 3x2.0 cm. It contained a yellowish gray purulent material which grew out *Herellea* species organisms in pure culture. Histologically a typical pyogenic abscess was identified. In the second autopsy case, the pus was removed from a small focal abscess of the right lung. During the patient's life, there were no signs or symptoms to suggest the presence of this abscess. Histologically, a typical pyogenic abscess was identified.

Pure Cultures From Blood: Seventeen patients had positive blood culture containing organisms of tribe Mimeae. Eleven cultures represented those from patients, two were from donor blood and four were from autopsy cases.

Seven of the 11 patients manifested high fevers of unknown origin. The temperatures ranged up to 104°F. There were chills and somnolence. Three of the remaining patients respectively had symptoms of pneumonia, asthma and costovertebral pain. The remaining patient had no symptoms and the blood culture was recorded as routine. Of the seven patients with high fevers, six recovered with specific antibiotic therapy. One patient died, but an autopsy was not allowed. The three patients with the other diseases, improved with treatment of their specific diseases. The remaining patient received no therapy and improved. All blood cultures were negative after therapy.

Two patients each developed chills and fever following transfusions of 500 cc. of whole blood. Only the donors' blood were cultured which grew out pure cultures of *Herellea* species. The two patients recovered on symptomatic therapy.

In the many routine blood cultures taken at autopsy, pure cultures of Mimeae organisms were obtained in only four instances. There were no symptoms or signs to indicate a septicemia prior to the death of the patients.

Pure Cultures From The Spinal Fluid: Pure cul-

tures of Mimeae organisms were isolated from the spinal fluid in three cases. One case was that of a young child who had signs and symptoms of an acute meningitis. There was a pleocytosis consisting mostly of neutrophils. The spinal fluid was cloudy and under increased pressure. Before complete identification of the causative organism, the child died and an autopsy was not allowed. The second case was an instance in which on a routine spinal fluid culture Mimeae organisms were isolated in pure culture. There were, however, no clinical symptoms or signs of meningeal disease. The cell count was less than five lymphocytes. The third case was an instance in which the organisms were isolated from the spinal fluid at autopsy. The clinical signs and symptoms as well as autopsy findings did not show evidence of meningeal disease.

Pure Cultures From Urethral Secretions: There were three male patients who presented with burning sensations in the urethra. A yellowish white discharge was described originally. Each person was treated unsuccessfully with penicillin. Following the cultures, organisms of the tribe Mimeae were identified. Appropriate antibiotics were used after sensitivity determinations. All three patients were reported cured in five-seven days.

Pure Culture From Synovial Fluid: A male patient with acute swelling of both knees presented himself at the hospital because of his inability to walk. A pure culture of *Herellea* species was isolated from fluid of the left knee (previously published by the authors⁷). Institution of appropriate antibiotics resulted in the patient's recovery.

Pure Culture From Bronchial Secretions and Sputa: There was only one case in which a pure culture of Mimeae organisms was isolated from bronchial secretions and sputa. The symptoms manifested by the patient were vague evidences of an upper respiratory infection which was thought to be viral in origin. The patient received symptomatic therapy and recovered.

DISCUSSION

Bacteriology. Organisms designated as members of the tribe Mimeae are small, gram negative to gram variable, pleomorphic, capsulated, diplococoid rods with some strains exhibiting a tendency to give bipolar staining. They grow well on simple media and isolation and identification is done by routine methods. Biochemical activity is slight and

often delayed. Classification of these organisms is possible by serologic methods using specific antisera.

Mimeae grows as a white-gray glistening mucoid colony, 1-3 mm. in diameter. Some rough colonies are occasionally encountered. On EMB or MacConkeys, the appearance of the colonies is not different from that of other non-lactose fermenters. Newly isolated strains usually resemble diplococci in stained smears. Smears made from broth and subcultures are usually more pleomorphic and show definite bacillary as well as coccoid forms.

Two genera of Mimeae have been isolated in our laboratory, *Mima* and *Herellea*. *Mima* and *Herellea* have no reaction on TSI agar, but the latter organisms ferment 1 per cent dextrose broth aerobically with a noticeable acidification first on the top layer of the broth. *Herellea* species ferments 10 per cent lactose agar slants but not 1 per cent lactose broth. *Mima* species do not ferment any carbohydrate and has a rather negative biochemical picture. A variant, *Mima polymorpha* var *oxidans* is oxidase positive. Both genera are nitrate negative.

Because the organisms of tribe Mimeae can resemble morphologically or biochemically other gram negative organisms such as *Neisseria*, *Pasteurella*, *Pseudomonas* and *Alcaligenes*, methods of differentiation are necessary. *Neisseria* species grew poorly or not at all on EMB, MacConkey's and TSI, are oxidase positive and lack pleomorphism. Bacillary forms are not found in original or subcultures. Species of *Pasteurella* and *Bordetella* that will grow in simple media are differentiated from Mimeae on the basis of biochemical studies and penicillin susceptibility¹².

An aid in the separation of Mimeae from the *Pseudomonas* and *Alcaligenes* group is the oxidase test of Gaby¹³ as well as the morphological differences. *Malleomyces* species exhibit some of the morphological features of Mimeae but only grow well on media containing blood serum and other body fluids. Two factors that act as a guide in distinguishing *Mimeae* from the enterobacteriaceae are its fermentation pattern in dextrose and its inability to reduce nitrate.¹⁴

As noted in the brief clinical summaries, there is a definite correlation in the majority of cases of symptoms, signs, the isolation of the organisms in pure culture and the disappearance of symptoms following specific antibiotic therapy. There were

instances in which no symptoms or signs were recorded. The authors attribute this to the fact that the primary diseases of the patients overshadowed the signs and symptoms thus placing little or no significance on the presence of these organisms. During the early part of the 1950's, little was known about the pathogenicity of these organisms in spite of the fact that they were frequently isolated in our laboratory. During the latter years of this study, the clinicians have become increasingly aware of the possible role that these organisms play in pathologic processes.

The symptoms presented by the patients with these organisms in the urine, indicate that the patients may have pyelonephritis, pyelitis or cystitis. On specific antibiotic therapy, the urine cultures became negative. These showed good correlation. However, there were cases in which the urinary findings could not be correlated with the patient's symptoms. In these instances the authors considered contamination. However, it is the exception rather than the rule for pure cultures to be contaminants. There are many urine cultures in which Mimeae organisms are isolated along with other organisms in mixed culture. The symptoms and signs have been the same as noted above. These were excluded from the study for better standardization.

One case in which the spinal fluid contained the organisms shows excellent correlation between signs and symptoms and isolation of the organism in pure culture. The spinal fluid of the other two cases may have been contaminated since these organisms are thought to be endogenous to man.¹⁵

There is excellent correlation between the isolation of the organisms from pus. This was shown very well in the cases of the brain abscess, cutaneous abscesses, ischio-rectal abscess and the chest ulcer. The authors feel that the case of the brain abscess due to *Herellea* organisms is the first reported in the English literature.

The isolation of pure cultures from the blood showed poor correlation in that the symptoms in only seven cases were in keeping with the bacteriologic findings. It is suggested that this may have resulted from contamination. Contamination was probably responsible for the organisms being present in the two donors' blood and in the blood cultures taken at autopsy.

Of interest is the fact that anterior urethritis has

been associated with the isolation of the Mimeae organisms. A problem exists when a diagnosis of gonorrhea is made by smear because these organisms resemble *Neisseriae* morphologically and may be found intra and extra-cellularly. They must be distinguished by cultural and biochemical means. These organisms are invariably resistant to penicillin to which *Neisseriae* are sensitive. Should suspected gonorrheal urethritis be resistant to penicillin therapy, re-evaluation is warranted because one may be dealing with tribe Mimeae organisms. The clinical pictures of the three patients with urethral discharges followed very much the same pattern as stated above. Following the correct diagnosis by cultural and biochemical studies on the secretions, the patients received proper therapy and were cured.

The isolation of *Herellea* species from a case of acute synovitis (published by the authors⁷) shows excellent correlation between signs and symptoms and response to antibiotic therapy.

Since it has been stated that tribe Mimeae organisms may be found in pharynx¹⁵, it is conceivable that this is the possible explanation of their presence in the bronchial secretions. Because the patient recovered without antibiotic therapy, his symptoms probably were not due to these organisms.

Of the several antibiotics studied and tested, the organisms, *Herellae* and *Mima* are virtually resistant to penicillin. There is a better response to the tetracycline type of antibiotics.

It has been stated that organisms of the tribe Mimeae may be endogenous to man in that they are found in the pharynx, lower intestine, external genitalia and vagina¹⁵. The authors suggest that when proper conditions are present (lowering of resistance, following indiscriminate use of penicillin or other antibiotics), these organisms may produce pathologic changes in the host.

SUMMARY

The correlation of clinical symptoms and signs, the isolation of the Mimeae organisms in pure culture and disappearance of symptoms and organisms following specific antibiotic therapy supports previous reports in literature that these organisms are pathogenic. In 53 out of 235 cases organisms of tribe Mimeae were isolated in pure culture during the period 1951-1959.

A diagnosis of gonorrhea urethritis should not

be made on smear alone. When suspected gonorrhea urethritis resists penicillin therapy, organisms of tribe Mimeae should be suspected.

These organisms may become pathogenic when resistance is lowered and or following indiscriminate use of penicillin therapy.

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