
**RELATIONSHIPS BETWEEN PRIMARY FIBROMYALGIA
SYNDROME AND MENSTRUAL LIFE: PROVOCATIVE
PARALLELS**

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Primary Fibromyalgia Syndrome

Primary fibromyalgia syndrome (PFS), is the third most prevalent condition after osteoarthritis and rheumatoid arthritis seen in rheumatology clinics (Wolfe & Cathey, 1983). It is characterized by diffuse muscular aches and pains with no obvious pathological cause, and is reported to occur exceedingly more often in women rather than in men.

PFS patients can be distinguished from nonpatients by the presence of multiple discrete tender points, muscle stiffness upon awakening, fatigue, and sleep disturbance (Smythe & Moldofsky, 1977). The patients, however, are not aware of the tender points, only of pain and stiffness (Smythe, 1986). Almost all patients complain of low back or neck pain and some suffer from headache and irritable bowel. Patients report difficulty in performing activities of daily living and work activities (Campbell & Bennett, 1986; Wolfe, 1988). They have also been found to have lower pressure pain threshold and tolerance in comparison with nonpatients (Scudds et al., 1987) as well as to score higher on depression, anxiety and hypochondriasis scales (Scudds et al., 1987; Goldenberg, 1987; Payne et al., 1982; Ahles et al., 1984; Wolfe et al., 1984).

A controversy has existed for a long time as to whether this syndrome is a distinct rheumatic disease entity or a psychogenic problem confused with anxiety and depression disorders (Beetham, 1979; Bohr, 1987; Boland, 1947). Ellman and Shaw (1950) suggest that "the patient aches in his limbs because in fact he aches in his mind." Payne et al. (1982) state that "patients with this disorder hurt continuously and are unhappy individuals with multiple psychological problems." This controversy is

also reflected in the multiple names used to refer to this disorder: fibrositis, fibromyositis, psychogenic rheumatism, muscular rheumatism, interstitial myofibrositis, and fibromyalgia syndrome. Now, it is mostly referred to as primary fibromyalgia syndrome (PFS).

Psychogenic accounts of fibromyalgia probably resulted from lack of evidence of pathophysiology. There is no joint swelling or inflammation with fibromyalgia unless it occurs as a concomitant disorder (secondary fibromyalgia). Also, normal laboratory results are found for complete blood count, sedimentation rate, creatine phosphokinase, glutamic oxaloacetic transaminase, antinuclear antibody, rheumatoid factor and free thyroxine levels. In addition to psychological disturbance, PFS has also been attributed to non-random eye movement (REM) sleep disturbances, central nervous system (CNS) endorphin and enkephalin disturbances, and mechanical stresses of the lumbar and cervical spine. The etiology of the syndrome is, however, largely unknown, and there is no definitive treatment for it (Smythe, 1980).

This rheumatological disorder has recently received dramatically increasing medical attention (e.g. Goldenberg, 1987). This disorder is especially intriguing in view of a number of its characteristics. First, the disorder is overwhelmingly more common among women than among men. Second, patients suffering from PFS score high on psychopathological scales of common personality tests (beyond any elevations which can be attributed to sickness in general); in fact, a Stanford physician has claimed that "there simply has never been good evidence for fibromyalgia as a syndrome distinct from affective disorders....and the advantages fibromyalgia carries with it as a diagnosis are that patients accept it far more easily than the diagnosis of depression, and so do insurance companies" (Bohr, 1987). Third, the disorder has been linked to such gynecological problems as dysmenorrhea, premenstrual syndrome (Yunus & Masi, 1985), surgically induced menopause and estrogen deficit (Waxman & Zatskis, 1986).

PFS is more likely to afflict women of early middle age. During that time, many women experience menstrual disorders, may undergo gynecological surgery, and begin their climacteric years. In terms of physical suffering and

mental distress, PFS is a significant disorder, yet very little is known about its etiology, its natural history, and its alleviation by psychological rather than pharmacological methods. Furthermore, the variable link between personality disturbance and physical illness which has been implicated in PFS is largely suggestive rather than proven.

We have undertaken a series of studies to investigate the link(s) between the chronic syndrome of primary fibromyalgia and menstrual status, with particular emphasis on the climacteric period. Links could exist in terms of symptom overlap and/or common predisposing or exacerbating factors such as hormonal changes and life stress.

No epidemiological studies exist to-date on the incidence of this syndrome in the general population. The literature on fibromyalgia stems from clinical studies utilizing patient populations who have deliberately sought treatment. Based on data from outpatient rheumatology clinics, the clinical prevalence of PFS varies from 3.7% - 20% (Wolfe, 1986; Yunus et al., 1981). This group, however, is potentially biased because of self-selection; there may be people suffering from fibromyalgia who do not present themselves to the clinic. As noted by White et al. (1961), fewer than one third of the people who report experiencing episodes of illness consult a physician. However, the existing clinical studies agree that the syndrome is most common in women of early middle age (Goldenberg, 1987; Payne et al., 1982; Yunus, et al., 1981; Wolfe, 1983).

Menstrual Life

The sex difference in the incidence of reports of PFS and its occurrence in women of early middle age have led to an interest in the role of female hormones in this disorder.

Advancing age during reproductive life is accompanied by significant changes in the hormonal environment (Mussey et al., 1987). Early middle age marks the beginning of the climacteric. This is a transitional period in women's lives that takes place between 35-55 years of age. Menopause, the cessation of menstruation, occurs within the climacteric, ranging between 40-55 years in different women, with a mean of 51.4 years. Diminished ovarian

function results in the decrease of estrogen secretion which is then associated with an increase in the level of follicle-stimulating hormone (FSH) and later in that of luteinizing hormone (LH). This occurs as a consequence of the suppression of the negative feedback between gonadal estrogens and gonadotrophin secretion (Sherman et al., 1976; Rozenberg et al., 1988).

Clinical studies show that one distinct group of somatic symptoms associated with the climacteric is musculoskeletal in nature, characterized by aches and pains in the back, shoulder, elbows, and hands (Greene, 1976; Studd et al., 1977). Epidemiological studies, however, have shown that vasomotor changes (hot flushes and sweating) and sleep disturbance are the predominant symptoms associated with the menopause (Jaszmann et al., 1969; Lennon, 1982; McKinlay et al., 1987; Kaufert et al., 1988).

The association of psychological and psychosomatic symptoms with menopause remains to be fully established, but common symptoms include irritability, depression, tension, palpitations, sleeplessness and reduced energy levels (Brown & Brown, 1976; Greene, 1976). An increased rate of psychiatric symptoms has also been reported to occur in the early climacteric prior to menopause (Balinger, 1975). Similar findings about depressive symptoms have also been described by Weissman (1979). Despite differences in methodology, there is a general agreement among studies that a non-specific psychological change occurs during the climacteric (Cooke, 1984).

Somatic, vasomotor, and psychological symptoms have been shown to represent three independent clusters that are hypothesized to be caused by different mechanisms (Greene, 1976). The first two clusters obtained with symptomatic menopausal women, namely, somatic-musculoskeletal and psychological, suggest close similarities with fibromyalgia and require further investigation, particularly in view of the fact that both conditions may occur concurrently in women.

The influence of female sex hormones in other rheumatic diseases such as primary gout, rheumatoid arthritis and osteoarthritis has already been documented. Specifically,

both female and male gout patients were found to have significantly lower plasma levels of follicle-stimulating hormone (FSH), luteinizing hormone (LH), and 17 beta-estradiol, and a higher ratio of testosterone/17 beta-estradiol as compared to controls (Marinello et al., 1985). The incidence of rheumatoid arthritis in previous users of oral contraceptives was found to be half that of non-users (Vandenbroucke et al., 1982).

The relationships between menstrual status and PFS have not yet been carefully investigated, although anecdotal reports and one published study (Waxman & Zatskis, 1986) suggest a possible link. Menstrual status here is defined on the basis of the presence or absence of naturally occurring gonadal hormones. The menopause, of course, best exemplifies this definition and will be the focus of this investigation. In particular, a number of issues deserve attention:

1. Could the experience of a major biochemical and psychological event such as the menopause serve as a predisposing factor in the development of PFS in some women? On the other hand, is severity of menopausal symptoms related to fibromyalgia? In the first case, the menopause may serve as a predisposing physical and psychological stressor for the development of fibromyalgia. A physical stressor in this case would be the changing hormonal environment and the associated vasomotor changes. Waxman and Zatskis (1986) surveyed a random sample of 100 female patients from rheumatology clinics, and found that menopause preceded the onset of fibromyalgia symptoms in 65% of the patients. More than half of these women were rendered menopausal because of hysterectomy-oophorectomy or bilateral salpingo-oophorectomy (BSO), and more than half of all menopausal women were not receiving estrogen therapy at the time of diagnosis. The investigators suggested that estrogen deficit may be responsible for PFS symptoms in this group.

The role of gonadal hormones and gonadotrophins in PFS has not yet been assessed. Changes in the hypothalamic-pituitary-ovarian axis occur over a period of many years prior to the onset of menstrual irregularity which precedes menopause (Lenton et al., 1988). When FSH and LH were measured mid-follicularly in regularly

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menstruating women of 23-49 years of age, significant increases were found pre-menopausally for both of these hormones. A significant gradual increase in FSH was found when comparing groups of women aged 23-30 years with those aged 40-41 and older. LH became elevated around 48-49 years. In general, FSH increases 5-6 years prior to menopause whereas LH increases 3-4 years pre-menopause. Given that gonadotrophin hormone changes occur gradually for so many years pre-menopausally, it would be of great value to examine their levels in relation to the development and natural history of fibromyalgia in particular, and to climacteric symptoms in general.

Menopause can be considered as a psychological stressor in the extent to which it signifies the end of reproductive life and loss of femininity, especially for women who identify predominantly with the maternal role and are very committed to childbearing. Profound psychosocial changes occurring around the climacteric may influence the experience of menopause and precipitate medical conditions. The climacteric has been described as a period of "psychosocial transition" (Dominian, 1977), and the "empty nest" syndrome (Neugarten, 1979), as the time that the last child leaves home, the parents or husband may die or become very dependent on the woman, and the transition from the role of mother to that of grandmother.

Although these concepts have been difficult to operationalize and measure, some associations have been obtained between climacteric symptomatology and certain psychosocial variables experienced as stressful (Cooke, 1984). Stressful life events such as death of a significant other occurring within the climacteric period were found to predict somatic symptomatology (Cooke, 1984). Women during the climacteric show an increased susceptibility to stress. This susceptibility may be mediated by several psychosocial factors such as low social class, lack of employment outside the home, and lack of social support (Abe & Moritsuka, 1986; Brown & Harris, 1978; Cooke, 1984). Social class, education and employment have also been shown to predict

psychological and somatic symptoms independently of the life events experienced. Moreover, correlations have been obtained between negative attitudes toward menopause and symptomatology.

Stressful life events also contribute to the development, exacerbation, and maintenance of chronic pain syndromes, including low back pain, abdominal pain, and headache (Atkinson et al., 1980). It has also been demonstrated that these associations are a function of the relationship between stressful life events and depressive symptoms, at least in the case of low back pain (Atkinson et al., 1980). It would be interesting to examine patterns of these relationships with fibromyalgia and the climacteric.

Many patients report that their symptoms began with a stressful or emotional event, such as death in the family, a divorce, a job loss, an accident, a surgery, or trauma (Wolfe, 1986). However, these reports are only anecdotal and a systematic investigation of predisposing factors perceived as stressful has yet to be undertaken. Another way in which these two conditions (menopause and fibromyalgia) might be related is in terms of health utilization behavior. Recent evidence by McKinlay and co-investigators (1987) suggests that prior health status influences current health utilization behaviors. It is possible that increased exposure to the medical system in women with pre-existing chronic conditions such as fibromyalgia is more likely to result in the diagnosis of a new condition such as the occurrence of severe menopausal symptoms and/or the prescription of medications or surgery. Hypervigilance to bodily sensations may develop as a result of a chronic medical condition which then prompts the patient to seek medical attention from health care providers regarding other conditions. Women between 40 and 60 years also have been identified as frequent users of medical services and various medications such as psychoactive drugs (Cooperstock, 1978; Parry et al., 1973).

2. Are women who have completed their desired reproductive functions as likely to experience severe menopausal symptoms and/or fibromyalgia as those who have not? This question requires a psychological perspective which would view symptomatology more as

symbolic of the fact that menopause marks the end of the reproductive cycle. This question could be viewed also as an extension of the first one.

3. If similar symptoms do indeed occur in climacteric and fibromyalgic women of the same age, how much similarity is due to the aging process and associated life events as opposed to the changing hormonal factors.

4. Given that the natural climacteric experience is a gradual process, it would be of value to investigate whether fibromyalgia develops gradually or appears suddenly, in conjunction with either natural or artificial menopause. Sudden-onset menopause, induced by hysterectomy with ovariectomy (artificial menopause) could also be looked at in relation to the onset of fibromyalgia. Surgical menopause occurs in 30 per cent of all women (McKinlay, McKinlay, & Brambilla, 1987). Moreover, the effects of hormonal-replacement therapy, often used to alleviate symptoms of natural or artificial menopause, could be examined within this context.

5. What is the relationship between fibromyalgia and menstrual disorders such as dysmenorrhea? Dysmenorrhea is included in the profile of the fibromyalgia patient by Yunus et al. (1981, 1985). The common denominator between the two conditions is considered to be muscle spasms. Data presented by these investigators corroborates their clinical observations (Yunus et al., personal communication). Primary dysmenorrhea, along with irritable bowel and chronic headache were significantly more common in PFS patients than in patients with rheumatoid arthritis and normal controls. It would be interesting to examine PFS symptomatology in women with dysmenorrhea in a systematic way.

6. Is there variation of PFS symptomatology across the menstrual cycle? Specifically, are there any changes in tender point count and sensitivity according to menstrual cycle phase? Research employing various experimental pain induction techniques (heat, cold, electrical stimulation) has demonstrated fluctuations in pain sensitivity over the menstrual cycle (Procacci et al., 1974; Tedford et al., 1977; Goolkasian, 1980; Hapidou & deCatanzaro, 1988). In general, women tend to be more sensitive to pain in the second part of the cycle (following

ovulation) than to the first (preceeding ovulation). It would be interesting to see if such fluctuation occurs with clinical (fibromyalgia) pain as well.

Research Directions

The six research areas described in the previous section generate a host of interesting questions. Other issues arise as well. Do PFS patients and climacteric women share common symptomatology in terms of both somatic and psychological variables? Are symptoms mediated partly in terms of life stresses including the presence of a concurrent health condition? How does the presence of one condition influence reported symptomatology in the other? Are women with artificial menopause more susceptible to exhibiting severe symptomatology in organic and psychological areas than are women with natural menopause? Will patient groups of PFS and menopausal women exhibit greater responsiveness to laboratory pain as compared to non-patient women, more illness behaviors than nonpatient groups, and higher perceived stress? What are the differences on scales of depression, anxiety, hypochondriasis, illness behaviors, perceived stress, and symptomatology between PFS and gynecological patients?

Other questions also arise. Is there a common natural history of PFS and menopausal symptomatology? What is the relationship between hormonal levels and symptomatology in the two conditions? Are women on hormonal replacement therapy (HRT) or oral contraceptives (OC) as likely as those not on HRT or OC to experience PFS? What is the relationship between dysmenorrhea and fibromyalgia? Are women with dysmenorrhea more likely to experience PFS than women without dysmenorrhea? Are tender points "sensitive" to the menstrual cycle?

The literature reviewed here points to provocative parallels and generates a host of intriguing questions. As we and others explore the interrelationship of the rheumatological, gynecological, and psychological issues, a more fundamental understanding of the etiology treatment, and prevention of primary fibromyalgia should follow.

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References

- Abe, T. & Moritsuka, T.A. (1986). A case-control study on climacteric symptoms and complaints of Japanese women by symptomatic type for psychosocial variables. Maturitas, 8, 255-265.
- Ahles, T.A., Yunus, M.B., Riley, S.D., et al. (1984). Psychological factors associated with primary fibromyalgia syndrome. Arthritis and Rheumatism, 27, 1101-1106.
- Atkinson, J.H., Slater, M.A., & Grant, I. et al. (1980). Depressed mood in chronic low back pain: Relationship with stressful life events. Pain, 35, 47-55.
- Balinger, C.B. (1975). Psychiatric morbidity and the menopause: Screening of a general population sample. British Medical Journal, 2, 344-349.
- Beetham, W.P.Jr. (1979). Diagnosis and management of fibrositis syndrome and psychogenic rheumatism. Medical Clinics of North America, 63, 433-439.
- Bohr, T. (1987). Painful questions about fibromyalgia. Letter to the Editor. Journal of the American Medical Association, 258(11), 1476.
- Boland, E.W. (1947). Psychogenic rheumatism. The musculoskeletal expression of psychoneurosis. Annals of Rheumatic Disease, 6, 195-203.
- Brown, G.W. & Harris, T. (1978). Social origins of depression: A study of psychiatric disorder in women. New York: The Free Press.
- Burton, H.J., Kline, S.A., Lindsay, R.M. et al. (1986). The relationship of depression to survival in chronic renal failure. Psychosomatic Medicine, 48, 261-269.
- Campbell, S. M. & Bennett, R. M. (1986). Fibrositis. Disease of the Month, 32, 653-722.

- Cooke, D.J. (1984). A psychosocial study of the climacteric. In A. Broome & L. Wallace (Eds.) Psychology and Gynaecological Problems. London: Tavistock Publications, 243-265.
- Cooperstock, R. (1978). Sex differences in psychotropic drug use. Social Science and Medicine, 12, 179-186.
- Dominian, J. (1977). The role of psychiatry in the menopause. Clinics in Obstetrics and Gynaecology, 4, 3-29.
- Ellman, P. & Shaw, D. (1950). The "chronic rheumatic" and his pains. Psychosomatic aspects of chronic non-articular rheumatism. Annals of Rheumatic Disease, 9, 341-357.
- Goldenberg, D. L. (1986). Psychological studies in fibrositis. American Journal of Medicine, 81(Suppl. 3A), 67-70.
- Greene, J.C. (1976). A factor analytic study of climacteric symptoms. Journal of Psychosomatic Research, 20, 425-430.
- Hapidou, E.G. & DeCatanzaro, D. (1988). Sensitivity to cold pressor pain in sysmenorrhic and non-osymenorrhic women as a function of menstrual cycle phase. Pain, 34, 277-283.
- Jackson, D.N. (1972). The dynamics of structured personality tests. Psychological Review, 78, 229-248.
- Jaszmann, L., Lith, N.D., & Zatt, I.C.A. (1969). The pre-menopausal symptoms. Medical Gynaecology & Sociology, 4, 268-275.
- Kaufert, P.A., Gilbert, P. & Hassard, T. (1988). Researching the symptoms of menopause: An exercise in methodology. Maturitas, 10, 117-131.
- Lennon, M.C. (1982). The psychological consequences of menopause: The importance of timing of a life stage event. Journal of Health & Social Behavior, 23, 353-366.
- Lenton, E.A., Sexton, L., Lee, S., et al. (1988). Progressive changes in LH and FSH and LH:FSH ratio in women throughout reproductive life. Maturitas, 10, 35-43.
- Marinello, E. Riario-Sforza, G. & Marcolongo, R. (1985). Plasma follicle-stimulating hormone, luteinizing hormone, and sex hormones in patients with gout. Arthritis & Rheumatism, 28(2), 127-131.
- McKinlay, S.M. & Jefferys, M. (1974). The menopausal syndrome. British Journal of Preventative & Social Medicine, 28, 108-115.
- McKinlay, J.B., McKinlay, S.M., & Brambilla, D.J. (1987). Health status and utilization behavior associated with menopause. American Journal of Epidemiology, 125(1), 110-121.

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- Musey, V.C., Collins, D.C., Musey, P.I., Martino-Saltzman, D., & Preedy, J.R.K. (1987). Age-related changes in the female hormonal environment during reproductive life. American Journal of Obstetrics and Gynecology, 157(2), 312-317.
- Neugarten, B.L. (1979). Time, age and the life cycle. American Journal of Psychiatry, 136, 887-894.
- Parry, N. J., Balter, M. B., Mellinger, G. D., Cisin, I. & Manheimer, P. I. (1973). National patterns of psychotherapeutic drug use. Archives of General Psychiatry, 28, 769-783.
- Payne, T.C., Leavitt, F., Garron, D.C. et al. (1982). Fibrositis and psychologic disturbance. Arthritis and Rheumatism, 25, 213-217.
- Procacci, P., Zoppi, M., Manesca, M., & Romano, S. (1974). Studies of the pain threshold in man. In J.R. Green and R.A. Thompson (Eds.). Advances in Neurology, 4, New York: Raven Press.
- Rosenberg, S., Bosson, D., Peretz, A., et al. (1988). Serum levels of gonadotrophins and steroid hormones in the post-menopause and later life. Maturitas, 10, 215-224.
- Russel, I.J., Vipraio, G.A., Morgan, W.W., et al. (1986). Is there a metabolic basis for the fibrositis syndrome? The American Journal of Medicine, 81 (Suppl. 3A), 50-56.
- Scudds, R.A., Rollman, G.B., Harth, M. et al. (1987). Pain perception and personality measures as discriminators in the classification of fibrositis. Journal of Rheumatology, 14(3), 563-569.
- Sherman, B.M., West, J.H., Korenman, S.G. (1976). The menopausal transition: Analysis of LH, FSH, oestradiol and progesterone concentrations during the menstrual cycles of older women. Journal of Clinical Endocrinology & Metabolism, 42, 619-636.
- Smythe, H.A. (1985). Fibrositis and other diffuse musculoskeletal syndromes. In W.N. Kelley, E.D. Harris Jr, S. Ruddy, et al. (Eds.) Textbook of Rheumatology. Philadelphia: WB Saunders, 481-489.
- Smythe, H. (1986). Tender points: Evolution of concepts of the Fibrositis/Fibromyalgia syndrome. The American Journal of Medicine, 81(Suppl. 3A), 2-6.
- Smythe, H. & Moldofsky, H. (1977). Two contributions to the understanding of the "fibrositis" syndrome. Bulletin of Rheumatic Diseases, 28, 928-931.
- Studd, J., Chakravarti, S., & Okram, D. (1977). The climacteric. Clinics in Obstetrics & Gynaecology, 4, 3-12.
- Tedford, W.H., Warren, D.E., & Flynn, W.E. (1977). Alteration of shock aversion thresholds during the menstrual cycle. Perception and Psychophysics, 21, 193-196.

- Vandenbroucke, J.P., Boersma, J.W., Festen, J.J.M., Valkenburg, H.A., Cats, A., Huber-Bruning, O., & Rasker, J.J. (1982). Oral contraceptives and rheumatoid arthritis: further evidence for a preventive effect. The Lancet, Oct. 16, 839-842.
- Waxman J. & Zatskis. (1986). Fibromyalgia and menopause: Examination of the relationship. Postgraduate Medicine, 80 (4), 165-171.
- Weissman, M.M. (1975). The assessment of social adjustment: A review of techniques. Archives of General Psychiatry, 32, 357-365.
- White, K.L., Williams, F., & Greenberg, B.G. (1961). The ecology of medical care. New England Journal of Medicine, 265, 885-892.
- Wolfe, F. (1986). The clinical syndrome of fibrositis. The American Journal of Medicine, 81 (Suppl. 3A), 7-14.
- Wolfe, F. & Cathey, M. A. (1983). Prevalence of primary and secondary fibrositis. Journal of Rheumatology, 10, 965-968.
- Wolfe, F., Cathey, M.A., Kleinhenkel, S.M. et al. (1984). Psychological status in primary fibrositis and fibrositis associated with rheumatoid arthritis. Journal of Rheumatology, 11, 500-506.
- Wolfe, F., Hawley, D.J., Cathey, M.A. et al. (1985). Fibrositis: symptom frequency and criteria for diagnosis. An evaluation of 291 rheumatic disease patients and 58 normal individuals. Journal of Rheumatology, 12, 1159-1163.
- Yunus, M.B. & Masi, A.T. (1985). Association of primary fibromyalgia syndrome with stress related syndromes (abstr.). Clinical Research, 33(4): 932A.
- Yunus, M.B. Masi, A.T. & Aldag, J.C. (1989). A controlled study of primary fibromyalgia syndrome: Clinical features with other functional syndromes. Personal Communication.
- Yunus, M.B., Masi, A.T., Calabro, et al. (1981). Primary fibromyalgia (fibrositis): Clinical study of 50 patients with matched normal controls. Seminars in Arthritis and Rheumatism, 11, 151-172.

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