CORTICAL LESIONS AND SEXUAL BEHAVIOR IN THE MALE RAT

Dissertation for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
GAIL JOAN SELLSTROM
1973

This is to certify that the

thesis entitled

Cortical Lesions and Sexual Behavior

in the Male Rat

presented by

Gail Joan Sellstrom

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Psychology

Major professor

Date November 9, 1973

O-7639

ABSTRACT

CORTICAL LESIONS AND SEXUAL BEHAVIOR IN THE MALE RAT

By

Gail Joan Sellstrom

The sexual behaviors of 39 naive adult male Long-Evans rats were observed during three preoperative and three postoperative 20 minute sessions. Between preoperative and postoperative sessions 10 males received full bilateral electrolytic lesions to the cingulate cortex, 8 males received bilateral neocortical lesions, and 9 males had sham operations. The remaining 12 males received no surgical treatment. Analyses of fourteen measures of sexual behavior failed to yield significant lesion group effects. Replication effects were significant in three of the analyses. The results confirmed the work of Beach (1940, 1941) and were inconclusive with respect to the studies reporting impaired ability to perform sequential responses following cingulectomy.

CORTICAL LESIONS AND SEXUAL BEHAVIOR IN THE MALE RAT

By

Gail Joan Sellstrom

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Psychology

1973

ACKNOWLEDGMENTS

I particularly wish to acknowledge the scholarly and theoretical assistance provided by Professor Lawrence I. O'Kelly. I wish to express my gratitude to Professor Raymond W. Frankmann who willingly advised with respect to statistical aspects of the experiment, Dr. Glenn I. Hatton who made available a great deal of technical information as well as the surgical and histological facilities necessary for the completion of the experiment, and Dr. Lynn Clemens who suggested techniques for manipulating reproductive cycles and provided training in the observation and identification of sexual responses. Computerized analysis techniques were made available by Dr. F. Samuel Bauer. Also I wish to thank Richard H. Radius for the constant encouragement so patiently given during the final stages preceding completion of this dissertation.

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

The influence of the cingulate cortex on reproductive behavior in rats, hamsters, and cats has been investigated by systematically destroying the cingulate cortex and observing, under carefully controlled conditions, the extent to which the preoperative behavioral sequence was disrupted.

In 1940 and 1941 Beach reported that destruction of 20 percent of the cortex, regardless of site of destruction, had no detrimental effect upon the sexual behavior of male rats. Destruction of a greater percentage, up to 80 percent, was found to result in increasingly severe detrimental effects on the male rat's behavior. Beach's results (1940, 1941) confirmed the work reported by Davis (1939). Beach's (1940, 1941) results, as represented in terms of Lashley diagrams showing the percentage of cortex damaged, suggest that Beach did not systematically destroy the cingulate cortex. Also, it is not possible to determine how much of the cortex was damaged since only the surface area damaged and some vague descriptions of subcortical damage are given. A more systematic approach to the problem of sexual behavior and cortical destruction is

found in the reports of Larsson (1962, 1964). Larsson (1964), on the basis of his work in 1962, concluded that "bilateral lesions in the lateral parieto-temporal area of the cerebral hemispheres have more severe effects upon the mating behavior of male rats than injury to the medial parts of the frontal, parietal, and occipital lobes. Whereas lateral lesions permanently eliminated mating in several of the animals and lowered the activity of others, removal of the median cortex in no case did permanently abolish sexual behavior."

A survey of the literature suggests that experiments dealing with the effects of cingulectomy upon behavior patterns present in the animal's repertory at the time of surgery and common to a species, i.e., what are sometimes called instinctive behavior patterns, have involved the use of rats, hamsters, and cats. If one is willing to grant that response to emotional stimuli falls within the general class of behaviors being considered, i.e., the instinctive, then the results of Bard and Mountcastle (1948) suggest that the cingulate area may be functionally related to the level of stimulus intensity necessary to arouse characteristic responses. Bard and Mountcastle (1948) reported that cats with cingulate lesions show a decreased sensitivity to emotional stimuli.

Food hoarding behavior following cingulectomy has been investigated by Stamm (1954) and Bunnell and Pinder

(1964), the researchers using rats and hamsters, respectively. A comparison of preoperative and postoperative hoarding behavior revealed that rats with 8 to 17 percent of the median cortex damaged showed a large decrease in the measure of hoarding behavior, these rats also differing significantly from the relatively unaffected control animals (lateral cortical lesions) (Stamm, 1954). When groups were compared in terms of latency of hoarding responses the differences were less marked. Stamm (1954) also found evidence for a positive relationship between severity of cingulate damage and disruption in hoarding behavior.

According to Bunnell, et al. (1966), Bunnell and Pinder (1964) have demonstrated that Stamm's (1954) results have some generality in that they have been extended and confirmed for the hamster. Apparently Bunnell and Pinder (1964) believe that "the lesion effects were upon motivational factors, or, in terms of Beach's theory (1955), upon the sexual arousal mechanism (AM). The threshold of the AM, which is presumed to have both a cortical and a subcortical component in mammals, is influenced by (a) internal states and responses of the organism, and (b) exteroceptive stimulation" (Bunnell, et al., 1966). In an investigation of cingulate effects on duration, amount, and kinds of sexual responses in the male syrian golden hamster, Bunnell, et al. (1966) reported that cingulate postoperative behavior differed

temporarily from preoperative behavior in respect to number of intromissions made, duration, and the ability to maintain the typical position during autogenital cleaning, the frequency of intromissions being significantly decreased, the time required to perform standard responses being longer, and some imbalance during autogenital cleaning being evident. The only differences observed by the end of postoperative testing involved frequency of intromissions, recovery being incomplete in four of the seven cingulectomized hamsters. There was no immediately apparent disruption in motor behavior (Bunnell, et al., 1966). Although extracingulate areas damaged included the dorsal hippocampus, corpus callosum, fornix, and dorsal septum, Bunnell, et al. (1966) found no evidence for a relationship between extent of lesion and behavior of cingulectomized subjects.

The results obtained by Stamm (1955) and Slotnick (1967), in their investigations of the effects of cingulectomy on maternal behavior in rats, parallel those reported by Stamm (1954) and Bunnell and Pinder (1964) with respect to hoarding behavior. The experiments of Slotnick and Stamm differed in that Stamm's (1955) rats had delivered many litters prior to serving as subjects while Slotnick's (1967) rats were primiparous at the time of surgery. Both investigators reported that following cingulectomy maternal behavior, including such responses as nest building, retrieving of pups, and string pulling,

was severely disrupted. Thus, the number of litters delivered prior to surgery does not appear to be an important variable with respect to the effects of cingulectomy on maternal behavior.

General theoretical accounts of the functional significance of the cingulate area are summarized by Bunnell, et al. (1966) as follows: MacLean (1958) favors the notion that the limbic system is implicated in the control of instinctive behavior patterns, there being evidence "that certain limbic structures, including median (cingulate and retrosplenial) cortex, are particularly important to behaviors promoting survival of the species (e.g., reproductive activities)." As noted by Bunnell, et al. (1966), Pribram has suggested that the "essential function of the limbic system is the integration of behavioral components into smoothly functioning sequences and...the changes in instinctive, affective, or other classes of behavior which follow limbic manipulations are the result of alteration or disruption of the sequencing of acts which comprise such complex behaviors." With the exception of the experiments by Beach (1940, 1941), Davis (1939), and Larsson (1962), the evidence from experiments involving hoarding, maternal, and sexual behavior has tended to provide support for Pribram's theory.

Acquisition and retention following cingulectomy have been the focus of interest in studies in which

various measures of learned behavior are viewed as the dependent variables and attempts are made to demonstrate functional relationships between these performance measures and various manipulations in the cingulate region. These experiments may be distinguished by appealing to task characteristics. Thus, studies involving some form of noxious stimulation which the animal escapes or avoids by engaging in a specific activity include running to escape shock in a T-maze, bar-pressing to terminate a loud noise, withholding a response (e.g., drinking) to avoid shock (passive avoidance), and performing a specific response (e.g., running to the opposite side of a shuttle-box when the CS comes on) to avoid shock (active avoidance).

Before considering the first loosely related set of acquisition and retention studies it might be of value to discuss briefly the major issue involved. In most instances cingulectomy results in disruption of original learning of active avoidance responses and has no apparent effect on original learning of passive avoidance responses. Two major accounts of the functional significance of the cingulate cortex have been proposed in response to these results. Lubar and Perachio (1965) distinguish between the response-facilitation and the fear-facilitation drive hypotheses. Central to the response-facilitation hypothesis is the notion that the cingulate area facilitates behavioral

responsivity and that removal of the cingulate area might, therefore, be expected to result in an opposite pattern of effects, namely lessened behavioral responsivity. The fear-facilitation dirve hypothesis consists of the notion that this fear facilitation may be significantly related to inferior active avoidance responding. Two findings relating to the latter theory are those of Bard and Mountcastle (1950), in which cingulectomy reduced sensitivity to emotional stimuli, and Trafton (1965), in which cingulectomy increased freezing in response to what was presumably a fear stimulus.

The following three studies may be viewed as satisfying two cirteria: a) they involve some form of noxious stimulation; and b) they do not involve passive or active avoidance responding. Brady and Nauta (1953) observed CER retention in rats following training and surgical procedures appropriate to membership in the septal, cingulate, or unoperated control group. Brady and Nauta (1953) reported that only the septals showed greater emotional reactivity and an increase in the magnitude of the startle response. An experiment involving the effects of combined limbic, adjacent cingulum (area cingularis anterior ventralis of LA), and striae lesions on retention of lever-pressing-to-terminate-a-noxious stimulus behavior, was conducted by Lyon and Harrison (1959). In terms of extent of disruption of lever pressing to terminate a 105 db noise

for 20 seconds, the complete cingulate and control rats were very similar, further evidence suggesting that partial destruction of the area cingularis anterior ventralis results in no disruption of the lever pressing response (Lyon and Harrison, 1959). In terms of amount of time required to attain preoperative performance levels, Lyon and Harrison (1959) found that the distributions of experimental and control groups showed a considerable amount of overlap.

While the two studies just cited were primarily concerned with cingulate effects on memory or previously learned behavior the study of Thompson and Langer (1963) was focused upon original learning in rats. After their animals had learned to run to escape shock in a T-maze Thompson and Langer (1963) subjected the rats to lesions at several sites (summarized with accompanying results below) and, 2 weeks later, tested the animals on a reversal of position task. In terms of the effects of lesions on reversal performance the eight groups were described by Thompson and Langer (1963) as follows: (a) normal and neocortical controls showed no effect, i.e., a high level of accuracy; (b) precallosal anterior limbic, hippocampal, septal, and preoptic hypothalamic animals were significantly inferior to controls; and (c) supracallosal anterior limbic and fornix column animals were not significantly deficient. The authors also reported that reversal performance was not effected by

lesions in the pretectal or parafascicular area of the thalamus, the subthalamus, the substantia nigra, or the amygdala (Thompson and Langer, 1963).

Several investigators have been concerned with cingulate lesions and passive avoidance responding. Kaada, et al. (1962), working with rats, and McCleary (1961), Lubar (1964), and Cornwell (1966), all working with cats having mid-cingulate lesions, have reported that cingulectomized animals do not differ from normal animals in acquiring a passive avoidance response. Lubar (1964) found that cats with combined limbic cortex-septal area and cingulate lesions showed normal passive avoidance acquisition, while animals with damage limited to the limbic cortex-septal area were inferior to normals with respect to passive avoidance acquisition. Lubar's (1964) cats with lesions limited to the mid-cingulate area were more resistant to extinction of the passive avoidance response than were normal cats or cats with combined lesions. Kaada (1962) also reported that passive avoidance acquisition was normal regardless of what parts of the cingulate cortex and adjacent corpus callosum were damaged, i.e., the medial cortex lying in front of and above the corpus callosum, or the posterior cingulate cortex and/or retrosplenial cortex.

Before discussing typical active avoidance experiments it might be noted that a study conducted by Pribram and Weiskrantz (1957) differs from the most

widely cited studies in terms of subjects, design, and results. Rhesus monkeys were trained to avoid shock in a shuttle-box prior to surgery, and, following a one week recovery interval, were tested successively under extinction, reacquisition, and extinction conditions. Although active avoidance behavior was observed following lesions in several areas other than the medial frontal and cingulate cortex the only directly pertinent results were that cingulates did not differ from controls in terms of either extinction 1 or reacquisition performance and were superior to the controls (i.e., reached the extinction criterion more rapidly) in terms of extinction 2 performance (Pribram and Weiskrantz, 1957).

With the exception of the Peretz (1960) experiment, all of the studies below, focusing upon the acquisition of an active avoidance response following cingulectomy in rats, involved the use of a two-way shuttle box. When performance was evaluated in terms of trials to criterion, or a related measure, Thomas and Otis (1958), Thomas and Slotnick (1963), Trafton (1965), and Peretz (1960) found that cingulectomy resulted in inferior performance. One might note that in addition to damaging cingulum fibers connected to the posterior cingulate cortex, the experimental animals of Thomas and Otis (1958) sustained bilateral hippocampal damage. In the two experiments conducted by Thomas and Slotnick (1962), in which rats were postoperatively exposed either to CAR training

followed by maze training (Exp. I) or to the two procedures in reverse order (Exp. II), it was also found that cingulate lesions having an observable effect in the shuttle-box situation have no effect in the maze situation, regardless of procedure order, whereas prior maze learning significantly improved later CAR performance, the latter result being attributed to the handling of animals occurring during maze training.

The handling effect noted by Thomas and Slotnick (1962) might be considered in evaluating McCleary's (1966) account of Peretz's 1960 results. As noted earlier, Peretz (1960) obtained the typical active avoidance acquisition result in spite of his use of a one-way procedure in which rats avoided shock by running from a black to a white compartment. McCleary (1966), on the basis of the Candland, et al. (1962) finding that rats will learn to avoid a black compartment when the consequence of being present in the black compartment is a 20 second period of being stroked, head to tail, while being held in a gloved hand, claims that handling is aversive to the rat. McCleary (1966) further speculates that Peretz (1960) "may have introduced an approach-avoidance conflict into his one-way procedure" which "augments the avoidance conflict in cingulectomized rats" to the point where the deficit is "great enough to be manifested in the one-way situation." Before continuing it might be of value to note that Peretz's (1960)

cingulate animals were also inferior to shams, in terms of both total trials and oscillation trials to criterion, when oscillation was substituted for shock as the aversive stimulus. In terms of resistance to extinction, cingulates took more trials to criterion under oscillation conditions and did not differ from shams under shock conditions (Peretz, 1960).

Thomas and Slotnick (1963), in addition to finding the characteristic deficit under 2 to 3 hours food deprivation conditions, found that cingulectomized rats fail to show the deficit in CAR performance when run under high drive (daily feeding occurs immediately after trials) conditions. Thomas and Slotnick (1963) account for their results by suggesting that "lesions affect performance by enhancing the tendency of rats to freeze in response to the CS and the high hunger drive counteracts the freezing response by inducing heightened general activity which protects Ss from lesion-induced behavioral loss." Evidence regarding differential effects of full, anterior, or posterior cingulate damage was provided by Trafton (1965). Either full or anterior cingulate lesions led to a very severe deficit; i.e., 24 of the 25 rats comprising these two groups failed to show any evidence of learning the shuttle-box avoidance response within 100 trials, while rats with posterior cingulate lesions tended to freeze when running was appropriate and thereby showed a deficit in CAR responding.

Although the results for cats are less consistent it is not clear that cats differ markedly, if at all, from rats in respect to acquisition of an active avoidance response following cingulectomy. For example, results obtained by Cornwell (1966) are regarded as evidence that mid-cingulate lesions disrupt acquisition of an active avoidance response. However, Lubar (1964) reports that the mean trials to criterion for all four groups (combined limbic cortex-septal area and cingulate gyrus, limbic cortex-septal area, cingulate gyrus, and normal controls) were nearly identical, and later expresses suprise at failing to confirm McCleary's (1961) finding with cats. Cornwell (1966) found that cingulectomized cats required a mean of 67.7 (range of 25 to 200) trials to the active avoidance criterion while sham operated cats required a mean of only 39.5 trials (range of 14 to 70). Cornwell's cingulates also required more first retraining and second retraining trials than shams, the two groups being very similar in terms of crouching to the CS and measures of urination and defecation. McCleary (1966) suggests that the discrepancy between his own results (1961), as well as those of Cornwell (1966), and those of Lubar (1964) could be accounted for if one were willing to view the one-way avoidance task used by Lubar (1964) as easier than the two-way task used by the other two investigators.

In 1964 Moore exposed cats to CAR training

procedures in a double-grill shuttle-box prior to removal of the cingulate cortex and subsequently measured retention during no shock trials. In addition to finding that 5 out of 6 cingulates failed the retention criterion, Moore (1964) also found that, relative to septal animals and animals with combined (septum and hippocampus) lesions, cingulate animals were least effected in terms of retention and relearning, the 5 cingulate animals failing the retention test subsequently relearning in fewer trials than were required to reach the criterion preoperatively. On the basis of these results Moore (1964) postulates that while the cingulate cortex may play a role in habit retention, this role is not essential for retention or relearning.

A further confirmation of McCleary's (1961) findings is provided in the report of Lubar and Perachio (1965). These authors, in addition to demonstrating that cingulate cats are clearly inferior to controls with respect to two-way active avoidance acquisition and somewhat inferior to controls with respect to one-way avoidance acquisition, found that both controls and cingulates receiving one-way training were clearly superior to comparable groups receiving two-way training (Lubar and Perachio, 1965). Following acquisition each group was then given training in the alternate situation, the following series of results being obtained for the transfer sessions: a) regardless of group membership

animals transferred from one-way to two-way avoidance were inferior to animals transferred from two-way to one-way avoidance training; b) cingulates were similar to controls during one-way transfer and clearly inferior to controls during two-way transfer; and c) while control animals transferred to two-way avoidance were superior to animals originally receiving two-way training, cingulates did not differ from controls with respect to this measure (Lubar and Perachio, 1965). Lubar and Perachio (1965) also reported that during transfer training on the two-way task subjects, regardless of group membership, vocalized more frequently than subjects transferred to the one-way task. The authors felt that their results supported the fear-facilitation drive hypothesis, their conclusion being that fear in cats may be facilitated by cingulate lesions and that this facilitation may be a significant determiner of the active avoidance response deficit (Lubar and Perachio, 1965).

The discussion will now focus upon behavioral studies in which acquisition or retention of an instrumental response takes place without aversive stimuli. The scope of this discussion will be further limited by excluding experiments involving lever pressing behavior. Experiments satisfying these criteria involve visual discrimination, funnel displacement, and leg displacement. Because of their immediate relevance with respect to the present experiment, the alternation studies will be the

last non-aversive instrumental response studies considered.

Pribram, et al. (1962) pretested rhesus monkeys in a modified Wisconsin General Testing Apparatus, subjected them to surgical procedures designed to destroy pre-, sub-, and supracallosal cortex, and then gave them visual discrimination training. Pribram, et al. (1962) found that cingulates were slightly inferior to normals in terms of trials and errors to criterion. Peretz (1960), in the series of experiments previously cited, trained hungry cingulate and sham operated rats to discriminate between black and white cues. Using the correction procedure, Peretz (1960) found that cingulectomized animals were significantly superior to sham operated animals in terms of both trials and number or errors to criterion, there being no differences between groups in terms of latency of response on criterional trials. The cats used in the avoidance study of Cornwell (1966) learned to displace a funnel for food according to a VR schedule. Cingulates required a mean of 5.3 sessions (range of 2 to 10) and shams required a mean of 4.7 sessions (range of 0 to 10) to reach the criterion of having at most a 5 second latency on at least 90 of the 100 daily trials for 3 consecutive days. Cornwell's (1966) cingulectomized cats were also similar to the sham operates during extinction of the funnel displacing response.

A further experiment falling within the category of

studies involving difficult to classify tasks was conducted by Brutkowski and Mempel (1961). Prior to destruction of either the rostral cingulate or the posterior cingulate area dogs were trained to respond differentially on the basis of a discrimination between two tones reflecting CS+ and CS-, food reinforcement being presented only when the foreleg was placed on the food tray during CS+ presentation. Errors included failing to place the foreleg on the food tray during CS+ presentation and placing the foreleg on the tray during CS-. The authors obtained evidence suggesting that lesion site is related to the extent of instrumental response retention in that posterior cingulectomy failed to disrupt retention performance while rostral (genual area) damage resulted in a marked failure to inhibit responding during CS-, 4 to 15 days of relearning being required to regain preoperative performance levels. Brutkowski and Mempel (1961) felt that their rostral cingulates made more reward motivated responses, expected food regardless of which CS was being presented, and were more vigorous in taking the food. These results thus confirmed the earlier work of Brutkowski and his associates in which genual (or rostral) cingulectomy resulted in a temporary inability to withhold defensive CRs and an increase in correct and incorrect responses, emotional responses (violent rage and angry behavior), and fear-like responses. These results are regarded as evidence

suggesting that "the genual portion of the anterior cingulate area is one of the critical forebrain regions for the inhibition of some affective responses" (Brutkowski and Mempel, 1961).

It has been found that cingulectomy may either markedly facilitate (Peretz, 1960) or mildly disrupt (Pribram, et al., 1962) acquisition of behavior patterns involving visual discrimination. Cornwell's (1966) study, lacking the discrimination element common to the other three studies, has yielded results easily falling within what appears to be the normal range; i.e., Cornwell's (1966) cingulectomized cats were similar to Pribram, et al's (1962) cingulectomized monkeys in being only slightly, and adversely, affected. Continuing this negative trend, it has been found that cingulectomy not only leads to marked retention deficits but also leads to a marked increase in emotional responses (Brutkowski and Mempel, 1961). This latter result might be regarded as disconfirming, in some weak sense, the earlier results of Bard and Mountcastle (1950).

Attention shall now be focused upon experimental attempts to evaluate the effects of cingulate lesions on various aspects of lever pressing behavior. Of the seven bar pressing experiments to be considered only three involve the retention design while five represent attempts to assess the effects of lesions on original learning. The latter set includes three experiments in

which reinforcement is provided according to DRL schedules, those of Stamm (1963, 1964) involving rhesus monkeys while Ellen, Wilson, and Powell (1964) worked with rats.

Using delays ranging from 10 to 70 seconds, Stamm (1963) found that cingulates were similar to normals for delays up to and including 30 seconds, no cingulate meeting the acquisition criterion when longer delays were used. Normal monkeys were able to meet the learning criterion when delay intervals of less than 60 seconds were in effect (Stamm, 1963). In his 1964 study Stamm tested each animal by making the delay interval 60 seconds longer than the last delay interval experienced during training and found that cingulate monkeys were superior to normal monkeys in terms of rates of multiple presses; i.e., significantly higher rates of multiple responses (responses occurring within 2 second intervals) were observed for normal monkeys. Stamm (1964) also analyzed interresponse time distributions and reported that the timing responses of normals were less clear than those of cingulate animals. Stamm (1964) speculated that the multiple presses of the normal monkeys might reflect frustrative behavior while the superiority of the cingulates might be related to motivational functions of the cingulate cortex. The results reported by Ellen, Wilson, and Powell (1964), using rats and a 20 second DRL schedule, were comparable to those reported by Stamm (1963) for monkeys; i.e., cingulectomized rats acquired

the timing response as readily as normal rats.

As the final experiment in his series of four, involving the same subjects throughout the series such that the rats were lesioned 8 months prior to the experiment now being discussed, Peretz (1960) trained his cingulectomized and sham operated rats to bar press for food according to a CRF schedule. The animals were maintained at a level 10 to 15 percent below normal body weight. Following CRF acquisition Peretz (1960) substituted a VI schedule (range of 10 seconds to 7 minutes; mean of 3 minutes) for the CRF schedule, the six days using the VI schedule being regarded as a test sequence. In terms of both rate of bar pressing, i.e., number of responses per 30 minute session, and mean rate over the six sessions, the cingulates were significantly superior to the sham operates (Peretz, 1960). It is interesting that in two experiments using subjects representing quite distinct levels of evolutionary development and involving quite distinct temporal reinforcement schedules the results are comparable to the extent that cingulectomy facilitates original learning of the lever pressing response (Stamm, 1964; Peretz, 1960).

In one of the few studies involving water reinforced operant response learning Ellen and Powell (1962) compared the acquisition performance of septal and cingulate lesioned rats under a multiple reinforcement schedule comprised of FR 15 and FI 2 minute schedules.

Although Ellen and Powell (1962) did not find that acquisition performance varied as a function of lesion site they were able to report that the rate of responding by cingulates under the VI 2 minute schedule was significantly inferior to the corresponding behavior of the septal animals.

The experiment of Ellen and Powell (1962) was designed so as to permit the collection of data relevant to the evaluation of the effects of cingulectomy on retention performance. For those animals trained on FR 15 and VI 2 minute schedules prior to surgery retention testing was carried out on postoperative days one through twelve. Retention performance under FR 15 conditions did not differ for either group from preoperative performance. However, Ellen and Powell (1962) did find that retention performance under the VI 2 minute schedule was related to site of lesion, septals showing a marked and permanent increase in number of responses emitted while cingulates showed only a temporary increase in the number of responses made during the final part of the interval and continued to pause following reinforcement.

Extending the work of Stamm (1963), Glickstein, et al. (1964) trained monkeys to respond according to a DRL reinforcement schedule, subjected them to frontal lesions similar in extent to those reported by Stamm (1963), and then conducted postoperative retention tests. The

pattern of results presented in these two reports might be regarded as a reversal of the usual pattern; i.e., Glickstein, et al. (1964) found that cingulate lesions led to a disruption in retention of DRL performance whereas Stamm (1963) reported that cingulate lesions failed to influence DRL acquisition. Because Stamm's (1963) training procedure involved the presentation of what could be regarded as a consistent discriminative stimulus (2-second white light after each reinforcement), Glickstein, et al. (1964) feel that the animals were being trained "not to respond in the presence of a light" in the first 2-second interval, "a procedure which limits any conclusion about timing per se."

The third and final bar press retention study to be considered involved the preoperative training of rats to bar press in the presence of a discriminative stimulus, food being provided as reinforcement in accordance with a VI 15 second schedule, and the postoperative testing of retention and extinction performance (Schwartzbaum, et al., 1964). Schwartzbaum, et al. (1964) found that, relative to preoperative performance, cingulate responding during presentation of the reinforced discriminative stimulus (3000 cps pulsing tone at 70 db) was greatly reduced while responding during the presence of the non-reinforced stimulus (550 cps tone at 70 db) was not altered. The authors also found that extinction was facilitated by cingulectomy; i.e., the cingulates

showed less resistance to extinction than sham operates (Schwartzbaum, et al., 1964). The extinction results are accounted for in terms of the assumed function of the septal area and McCleary's (1961) concept of "response specificity" which assumes that "the facilitatory and inhibitory systems which control response tendencies normally operate in some reciprocal relationship to one another," such that "damage to one would increase the effects of the other...." (Schwartzbaum, et al., 1964). That is, removal of the cingulate area increases outflow from the inhibitory system (intact septal area) and thereby results in a relatively rapid cessation of responding. In commenting on the somewhat anomalous results reported by Peretz (1960), Schwartzbaum, et al. (1964) speculate that the superior visual discrimination learning shown by cingulectomized rats may be attributable to "enhanced inhibition of incorrect response tendencies ..." and later observe that the superior VI2 minute lever pressing performance of cingulate subjects reported by Peretz (1960) "was not evident in the cingulectomized subjects in the present study."

The alternation studies to be considered involve a design in which training is followed by surgery and effects of brain damage are evaluated by comparing postoperative and preoperative measures of performance on the same subjects as well as postoperative and preoperative measures between subjects. The results

provided by such experiments might be regarded as relevant to the question of the extent to which the cingulate area is an important determiner of processes related to original learning, retention of original learning (or memory), both of these, or, neither of these. The alternation studies also provide results relevant to Pribram's (1966) hypothesis involving the limbic system and the integration of responses in a given sequential task. It might be noted that Gross, et al. (1965) found that a deficit in original learning as well as in the retention of alternation behavior may result from lesions of the caudate nucleus, of the anterior cortex, of the hippocampus, or of dorsal thalamic structures. Thus the evidence does not appear to support the notion that the cingulate cortex has a unique function in the relevant processes.

The results reported for rhesus monkeys by Pribram, et al. (1962) and Pribram, et al. (1966) suggest that retention of neither a delayed alternation task nor of right left and go-no-go alternation is disrupted as a result of cingulate damage. However, in the former experiment acquisition of the delayed alternation task was disrupted following cingulectomy (Pribram, et al., 1962). In both cases an attempt was made to include the projection sector of the anterior thalamic nuclear group in the region destroyed (Pribram, et al., 1962; Pribram, et al., 1966).

The retention experiments cited seem to share a characteristic, namely, measures of retention performance do not appear to discriminate between normal and cingulectomized animals. Fortunately it is still reasonable to doubt the generality of this finding. Using a complex measure of behavior, consisting of the starting and running speed ratios of nonreinforced to reinforced trials, Barker and Thomas (1965) found that full cingulate lesions led to a significant disruption of acquisition and retention of a runway alternation task. Barker and Thomas (1965) also found that only one of five cingulate rats reached the relearning criterion within the 200 trials permitted, the remaining four rats failing to show any indication of retention or relearning.

On the basis of evidence obtained from experiments involving species-specific behaviors of the kind discussed in the present experiment, as well as the evidence reported by Michal (1965), Thomas, Hostetter, and Barker (1968) suggest that "the effects of lesions in dorsal limbic cortex on species-specific maternal and sexual behavior have indicated that mechanisms of temporal-response integration were impaired." The results of the series of studies conducted by Barker (1965) and Barker and Thomas (1965, 1966) are consistent with the hypothesis that the impaired functioning of mechanisms of temporal-response integration "might be evident in a behavioral end point in which a learned

sequence of responses was the dominant feature" (Thomas, Hostetter, and Barker, 1968).

The present experiment was conducted in order to determine the extent to which the cingulate cortex is, or is not, necessary to typically observed sexual behavior in the adult male Long-Evans rat. Preoperative and Postoperative sexual behavior was measured in terms of latency to first mount without penetration (mount), latency to first mount with brief penetration (intromission), latency to first mount with penetration and ejaculation (ejaculation), inter-response interval, number of mounts and intromissions occurring prior to each ejaculation, frequency of mounts, frequency of intromissions, frequency of ejaculations, postejaculatory interval, and presence or absence of autogenital cleaning between intromissions. These measures of sexual behavior were selected from those described in the reports of Bermant, et al. (1968), Dewsbury (1967), Beach (1956), Beach and Jordan (1956), and Beach and Whalen (1959).

On the basis of the evidence reviewed, the exceptions including the reports of Beach (1940, 1941), Davis (1939), and, perhaps Larsson (1962), it was supposed that full cingulectomy would lead to a disruption in the typical behavior pattern exhibited by the adult male Long-Evans rat. More specifically, it was supposed that the experiment would provide evidence indicating a failure to complete sequences of behavior

begun, such evidence being comparable to and consistent with the results obtained in studies of maternal behavior (Slotnick, 1967) and studies of alternation learning (Barker and Thomas, 1965, 1966). This supposition was not confirmed.

METHOD

Thirty-nine naive male and thirty naive female rats of the Long-Evans strain were obtained from the Chordata Corporation of Ontario, New York. The animals were 80 to 90 days old when first received and exposed to pre-experimental conditions. The subjects were 94 to 104 days old when preoperative testing began. The subjects were 130 to 140 days old at the termination of the experiment. The males served as experimental subjects while the females were used as stimulus animals. The males were housed one per cage whereas the females were housed six per cage, cages for males being 20.9 cm. long, 15.4 cm. high, and 17.6 cm. wide. Cages for females were 20.9 cm. long, 15.4 cm. high, and 57.2 cm wide. All cages were of the wire bottomed variety manufactured by the Wahmann Company. Water and Wayne Mouse Breeder Blox were available ad lib in the home cages throughout the experiment. All experimental subjects were weighed every other day prior to surgery. Following convalescence the subjects were again weighed every other day. When it became necessary to terminate one of the experimental subjects due to pneumonia, all animals involved in the experiment were given an intramuscular injection of

penicillin. The injections were administered on the last day of surgery, between the last testing session for that day and the start of surgical procedures.

A reversed light-dark cycle was used in order to maximize the probability of observing subjects during their periods of greatest sexual responsiveness. Replication I animals were housed in the experimental room and subjected to observation during the dark portion of the light cycle. Because of their unanticipated early arrival, replication II subjects were housed in a similar but separate room during the first 11 days of the reversed light-dark cycle. Replication II animals were moved to the experimental room three days prior to session one. Replication II subjects were then maintained in the experimental room until termination of the experiment.

All animals were exposed to the reversed light cycle for 14 days prior to being observed under experimental conditions. Two Knight all purpose automatic reset timers were used to control the light cycle. After 10 hours of darkness a 100 watt lamp was turned on by one of the timers, this lamp remaining on for 14 hours. One hour after the first 100 watt lamp was turned on a second 100 watt lamp was turned on, this lamp remaining on for 12 hours. The dark part of the cycle was in effect during the time interval beginning at 7 a.m. and ending at 5 p.m., all observation procedures being carried out

during these hours. Injections were administered during the latter part of the light portion of the light cycle.

All stimulus females used during preoperative and postoperative testing were brought into estrous once every 5 days. Ninety-six hours prior to the observation session the females were given a .05 cu. cm. subcutaneous injection of 1 microgram per .05 cu. cm. estradiol benzoate in sesame oil. This injection procedure was repeated 72 and 48 hours prior to observation. Six hours prior to observation the same females were given a .1 cu. cm. subcutaneous injection of .5 mg. per .1 cu. cm. progesterone suspended in sesame oil.

The apparatus consisted of a rectangular five sided plexiglass observation box and Esterline Angus recording equipment. The observation box was 50.6 cm. long, 37.4 cm. wide, and 37.4 cm. high, the missing panel in the rectangular box being the top panel. The plexiglass panels were approximately .5 cm. thick. During the observation sessions the floor of the observation box was covered with Royal Craft Cobmeal to a depth of approximately 6 cm. Indirect light was provided by a 15 watt lamp and animals were observed in an area screened off from the living cages.

Recording equipment consisted of a 20 channel Esterline Angus Recorder and a remote control panel, both of which operated through a 110 volt source. Two channels of the recorder were used and a paper speed of

3.8 cm. per minute was used throughout the testing sessions. During each observation session E sat approximately one meter from the front panel of the observation box. The recorder remained on during any given session, the beginning and end of any given observation period being indicated by pressing one of the two buttons mounted on the remote control panel and connected to the terminals of the recorder. One channel of the recorder was used to indicate the limits of the observation period, mounts without intromission, and sexual behavior followed by autogenital cleaning. The second channel was used to indicate mounts with intromission and ejaculations, the latter initialed on the recording paper by E as "E."

During preoperative and postoperative testing all animals were systematically exposed to the observation apparatus and members of the opposite sex. A copulating male, not used as an experimental subject, was used to test each female for receptivity. Only females exhibiting the lordosis response were used during the test sessions.

Three 20 minute preoperative testing sessions were carried out using females which had met the receptivity criterion, i.e., made at least one lordosis response with a non-experimental male. The recording apparatus was operating when the animals were placed in the observation box. The male was placed in the observation box for 10 minutes prior to the beginning of any test session. After

the male had spent 10 minutes in the box E placed a stimulus female in the center of the box, one pen on the recorder being deflected as the female was placed in the box. Any sexual behavior occurring during the 20 minute test session was recorded by deflecting one of the two pens on the Esterline Angus Recorder. A final deflection of the first pen occurred at the end of the 20 minute session. Each male was returned to the home cage following any given test session. Only males which had ejaculated at least once during preoperative session one were used as experimental subjects. Preoperative sessions two and three were conducted using the procedures described for session one. Two or three days intervened between sessions one, two, and three.

Of the 42 males observed during sessions one, two, and three, 10 were randomly assigned to the cingulate group, 10 were randomly assigned to the neocortical group, 10 were randomly assigned to the sham group, and 12 were randomly assigned to the normal group. Five cingulate subjects appeared in each replication. Due to illness, only 3 neocorticals appeared in replication I. Replication II involved 5 neocortical subjects. Sickness accounts for the fact that only 4 shams appeared in replication I. Replication II involved 5 sham subjects. Six normal subjects appeared in each replication.

All surgery was performed under ether anesthesia. Following anesthetization and head shaving, each animal

was immobilized by ear bars and bite bar of a Stoelting Stellar stereotaxic instrument. In order to avoid puncturing the ear drums, small bits of cotten were placed in the ear canals of each rat prior to placing the rat in the stereotaxic instrument. The top of the skull was exposed and the stereotaxic instrument was used to locate the point at which holes were to be drilled and to guide the electrode to the appropriate depth. The electrode consisted of a four cm. length of stainless steel dental wire .25 mm. in diameter, the electrode being insulated with epoxylite except for a .5 mm. tip.

In order to prepare the animal for cingulate lesions 10 small holes were drilled 0.8 mm. lateral to the midline on each side of the skull. The holes were drilled 1.0 mm. apart and extended from a point 4.5 mm. anterior to bregma to a point 4.5 mm. posterior to bregma. Full cingulate lesions were made at depths of 2.0 to 4.5 mm. below the skull in accordance with a brain map provided by David J. Barker (1966) and subsequently modified by E. In the case of each neocortical animal 10 small holes were drilled 1.5 mm. lateral to the midline on each side of the skull, the holes being spaced 1.0 mm. apart and being located symmetrically with respect to direction away from (posterior to or anterior to) bregma. All neocortical lesions were made at a depth of 2 mm. beneath the skull. In both lesion groups, i.e., full cingulate and neocortical, the dura was punctured

and anodal electrolytic lesions were produced by passing a 1.5 ma. direct current through the uninsulated tip of the electrode for 10 seconds. The lesion producing device was manufactured by the Stoelting Company.

Sham operation animals were subjected to the same surgical procedures used with cingulate and neocortical animals with the exception that operations were completed without puncturing the dura or in any way damaging the cortex. Normal animals were subjected to no surgical procedures.

The first postoperative tests were conducted 10 days after the completion of surgery. Stimulus females were brought into estrous and selected for receptivity as described for the preoperative tests. The three successive 20 minute postoperative test sessions were conducted in accordance with the procedures established prior to and existing during the preoperative testing sessions.

Upon completion of the third postoperative testing session the animals were sacrificed by overexposure to ether and perfused with physiological saline followed by an approximately 10 percent formalin solution. The brains were removed from the skulls immediately after perfusion and stored in approximately 10 percent formalin for at least three days. The brains were then transferred to a sucrose and formalin solution for at least three days prior to slicing and mounting. The brains of all

cingulate and neocortical animals were frozed and sliced into sagittal sections 50 microns in thickness, every section being mounted and stained. A cresyl violet Nissl stain for cell bodies was used. Using a microprojector and a magnification of 15X, alternate sections were projected for sketching. The extent of cortical damage was evaluated by measuring each sketch with a compensating polar planimeter.

RESULTS

Alternate sagittal sections were examined for each cingulate and neocortical animal completing the experiment. The results of histological analysis are summarized in Table 1. Total tissue damaged in cingulate animals varied from 24.5 to 61.5 cu. mm. Gliosis accounted for 6.5 to 26.5 cu. mm. of damage in the cingulate group, while 17.0 to 36.5 cu. mm. of brain tissue were completely destroyed in this group of animals.

Due to severe subcortical brain damage caused by a blood clot detected during histological analysis, data from neocortical subject number 20 (total damage involved 139.0 cu. mm. of brain tissue) are not included in any of the analyses.

Total brain tissue damage in neocortical subjects ranged from 26.0 to 90.0 cu. mm. Gliosis was apparent in 9.5 to 36.0 cu. mm. of brain tissue in neocortical animals, 16.5 to 57.5 cu. mm. of completely destroyed tissue accounting for the reamining damage.

Evaluation of pilot lesioned brains in terms of sketches on Lashley diagrams indicated that 10 percent or less of the surface area of the cortex is destroyed when

Table 1

Histological results for cingulate and neocortical lesion groups

Replication	Lesion Group	S	Total Damage mm^3	Gliosis mm^3	Destroyed mm^3	Undamaged Cingulate mm^3	Structures Slightly Damaged
I	cing	2	54.5	26.5	28.0	0.010	corpus callosum frontal pole hippocampus ant. olfactory nucleus
		6	40.5	6.5	34.0	0.014	corpus callosum frontal pole
		7	44.5	20.0	24.5	0.016	corpus callosum frontal pole hippocampus ant. olfactory nucleus
		12	39.5	13.5	26.0	0.008	corpus callosum frontal pole ant. olfactory nucleus
		18	39.5	10.5	29.5	0.000	corpus callosum frontal pole ant. olfactory nucleus

Table 1 (cont'd.)

Replication	Lesion Group	S	Total Damage mm^3	Gliosis mm^3	Destroyed mm^3	Undamaged Cingulate mm^3	Structures Slightly Damaged
I	neo	9	63.0	28.5	34.5		corpus callosum hippocampus caudate nucleus
		14	90.0	36.0	54.0	0.024	corpus callosum hippocampus caudate nucleus frontal pole cingulum
		19	61.0	21.5	39.5		corpus callosum hippocampus
II	cing	24	42.5	20.0	22.5	0.008	corpus callosum frontal pole ant. olfactory nucleus
		28	24.5	7.5	17.0	0.024	corpus callosum ant. olfactory nucleus
		29	38.5	12.0	26.5	0.008	corpus callosum frontal pole lat. septal nucleus

Table 1 (cont'd.)

Replication	Lesion Group	S	Total Damage mm^3	Gliosis mm^3	Destroyed mm^3	Undamaged Cingulate mm^3	Structures Slightly Damaged
II	cing	34	61.5	25.0	36.5	0.012	corpus callosum frontal pole lat. septal nucleus
		39	48.5	25.5	23.0	0.006	corpus callosum frontal pole hippocampus ant. olfactory nucleus lat. septal nucleus
	neo	27	38.0	19.0	19.0		corpus callosum hippocampus
		31	72.5	15.0	57.5		corpus callosum hippocampus caudate nucleus
		36	52.0	12.0	40.0		corpus callosum hippocampus

Table 1 (cont'd.)

Replication	Lesion Group	S	Total Damage mm^3	Gliosis mm^3	Destroyed mm^3	Undamaged Cingulate mm^3	Structures Slightly Damaged
II	neo	40	26.0	9.5	16.5		
		41	51.5	21.0	30.5		corpus callosum hippocampus frontal pole forceps major dorsal hippocampal commissure

lesions damage 24.4 to 39.0 cu. mm. of brain tissue.

In addition to severe cingulate damage, cingulates showed damage to a minor degree to the corpus callosum, dorsal hippocampus, frontal pole, and the anterior olfactory nucleus. Neocortical subjects showed extensive neocortical damage as well as minor damage to the dorsal hippocampus, corpus callosum, and caudate nucleus. Exceptions to this typical result are included in Table 1. Note that neocortical subject number 14 had cingulate damage in addition to damage characteristic of neocortically lesioned animals. Cingulate tissue spared in cingulate animals and subject 14 is noted in Table 1. The amount of cingulate tissue spared in cingulates varied from 0.000 cu. mm. to 0.024 cu. mm.

In the case of each of the fourteen analyses of behavioral data, a mean score was computed for the three preoperative sessions. A mean score computed for the three postoperative sessions was subtracted from the mean score for preoperative sessions. These difference scores were analysed according to an unweighted-means two by four factorial analysis of variance, the harmonic mean for all analyses being 4.6602. The mean difference scores are presented as a function of group membership in Figures 1 through 14.

The results of analyses of behavioral data are summarized in Table 2. All of the analyses failed to yield significant F values for lesion group. Analyses of

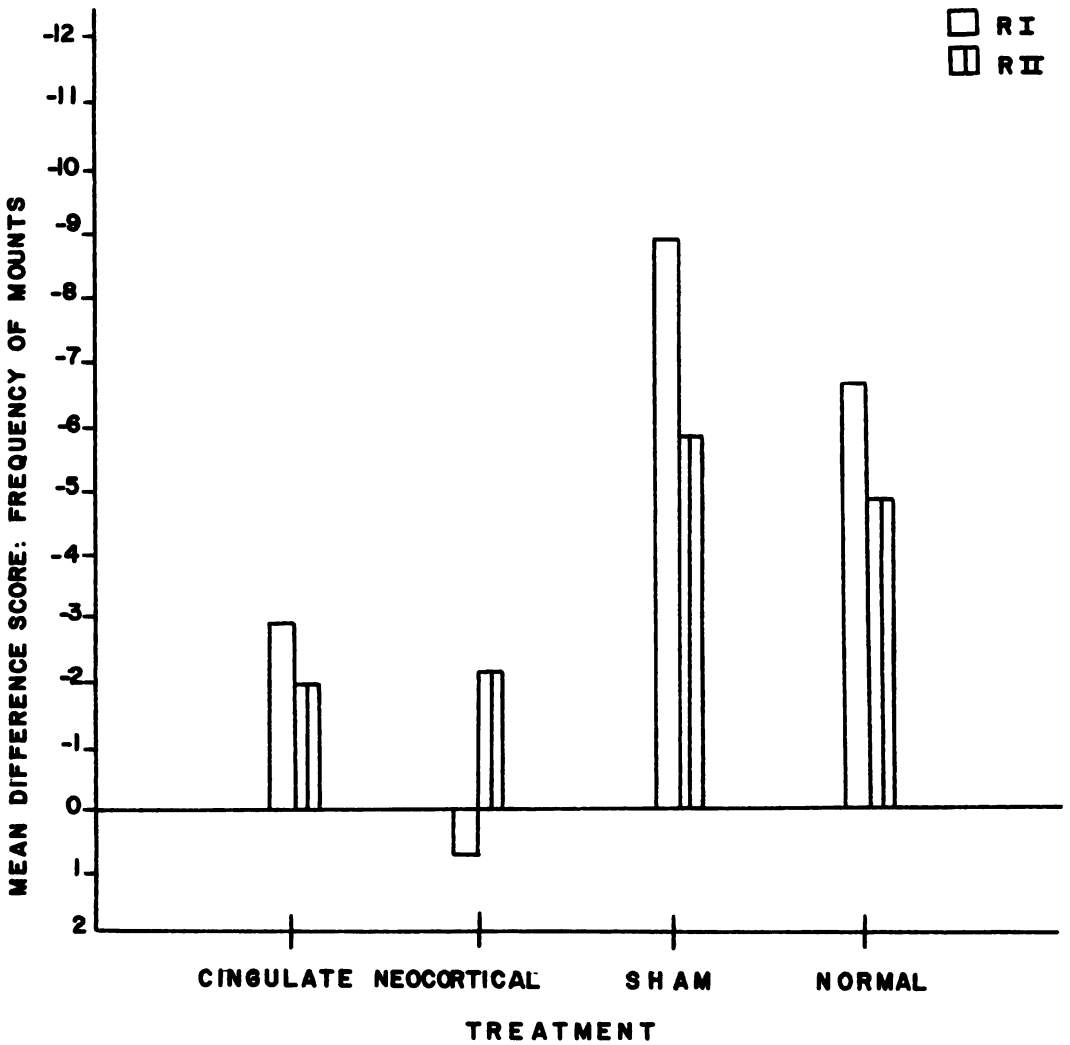

Figure 1. Mean difference score for preoperative and postoperative frequency of mounts in replications I and II as a function of treatment group.

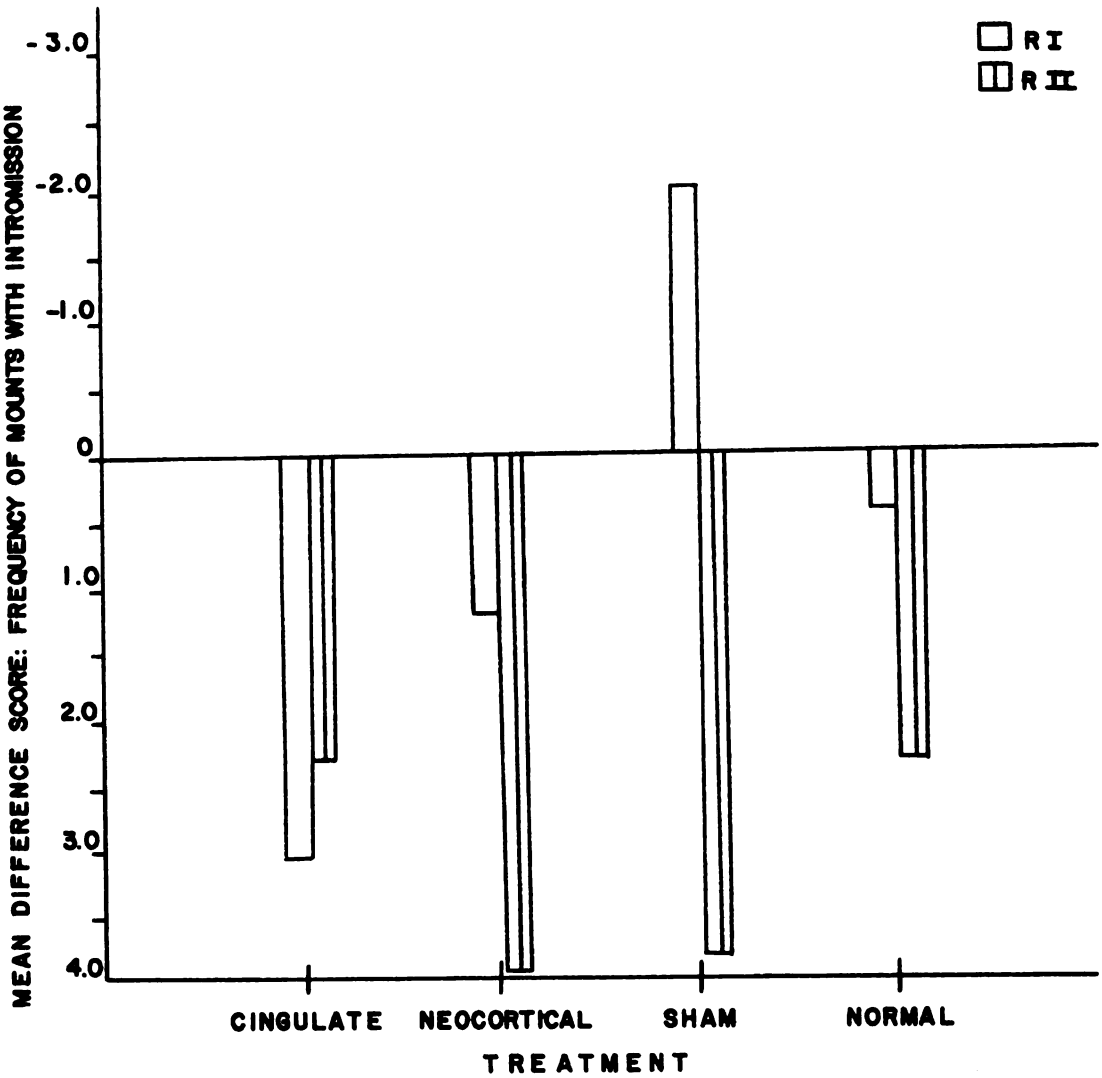

Figure 2. Mean difference score for preoperative and postoperative frequency of mounts with intromission in replications I and II as a function of treatment group.

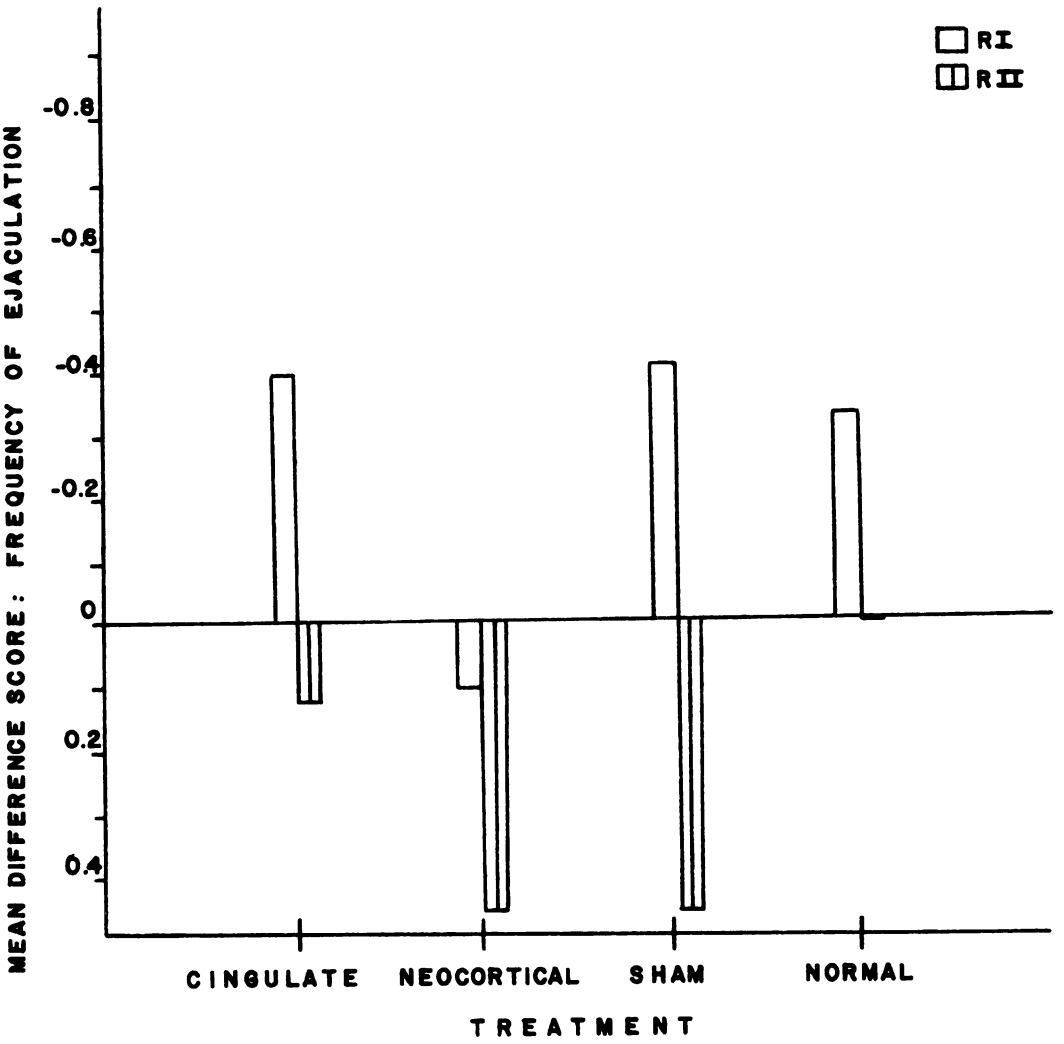

Figure 3. Mean difference score for preoperative and postoperative frequency of ejaculations in replications I and II as a function of treatment group.

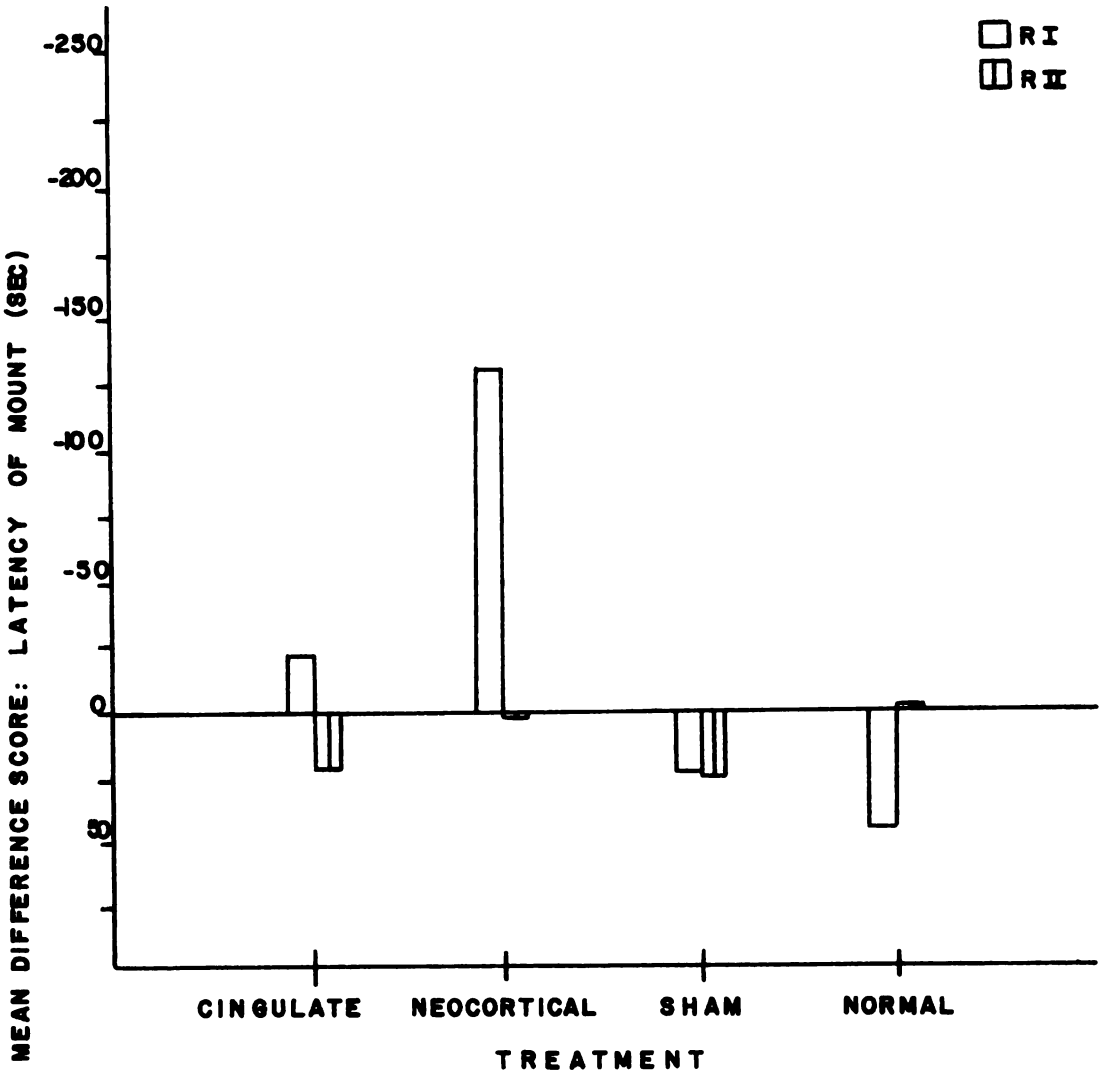

Figure 4. Mean difference score for preoperative and postoperative latency of mount in replications I and II as a function of treatment group.

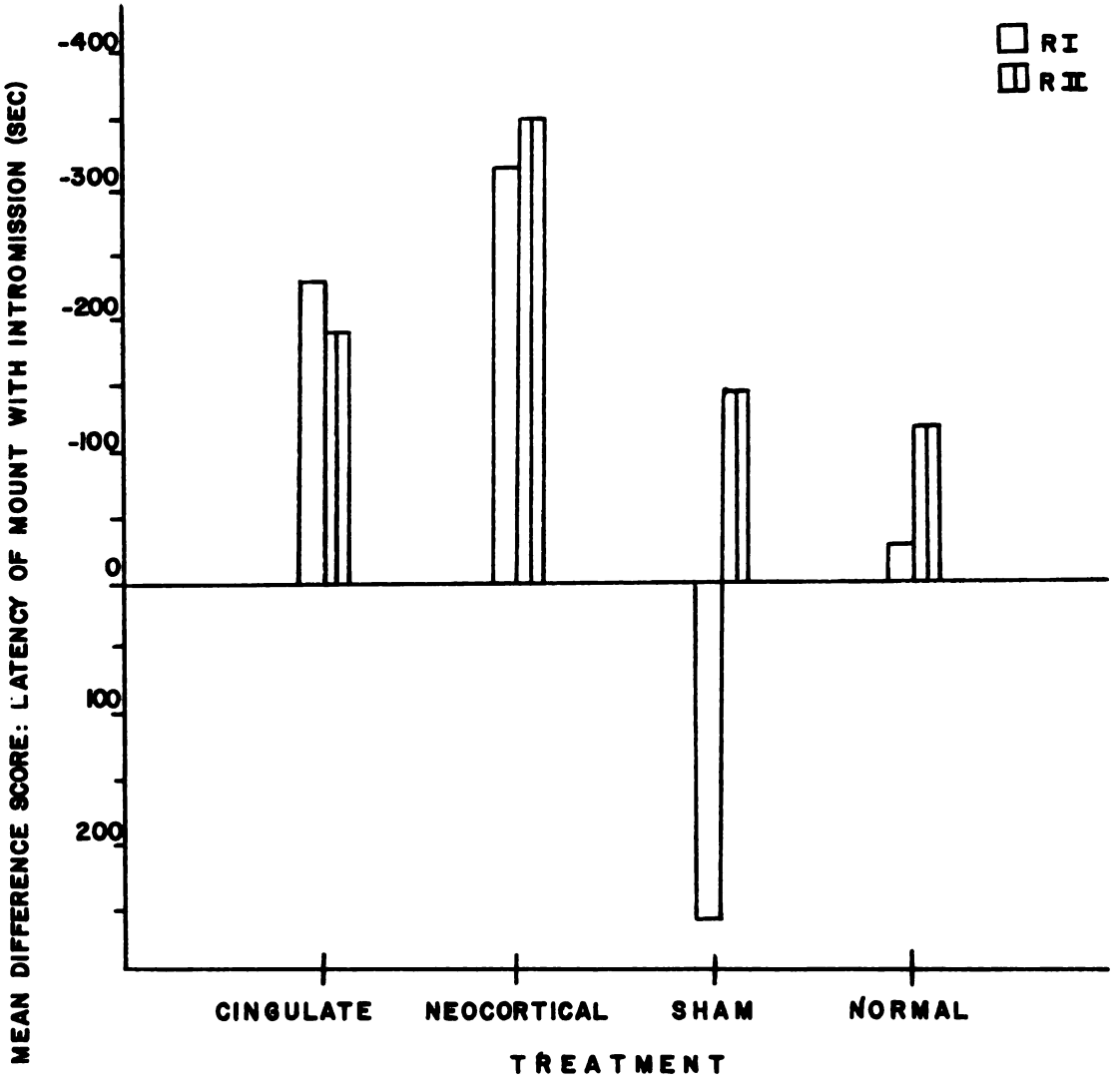

Figure 5. Mean difference score for preoperative and postoperative latency of mount with intromission in replications I and II as a function of treatment group.

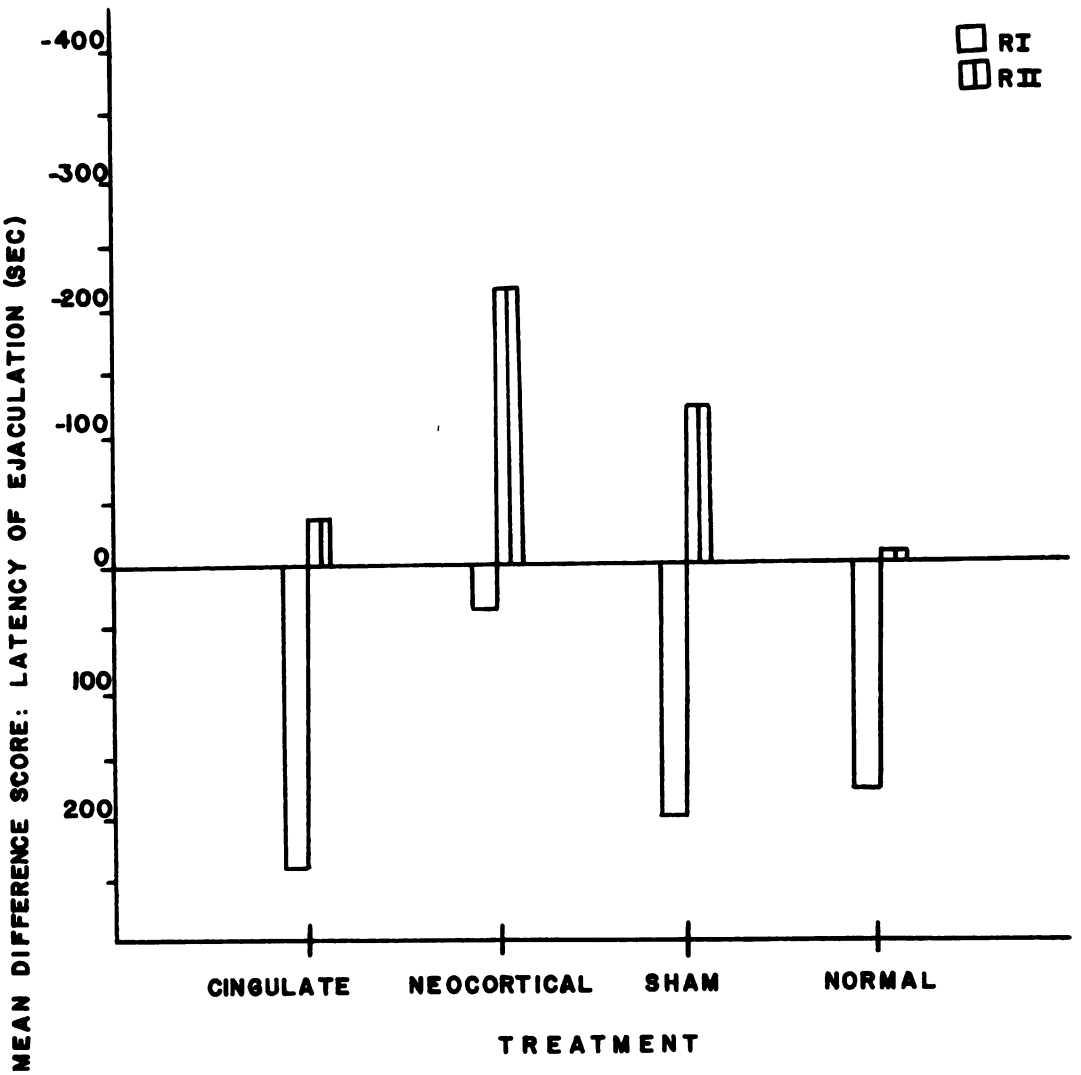

Figure 6. Mean difference score for preoperative and postoperative latency of ejaculation in replications I and II as a function of treatment group.

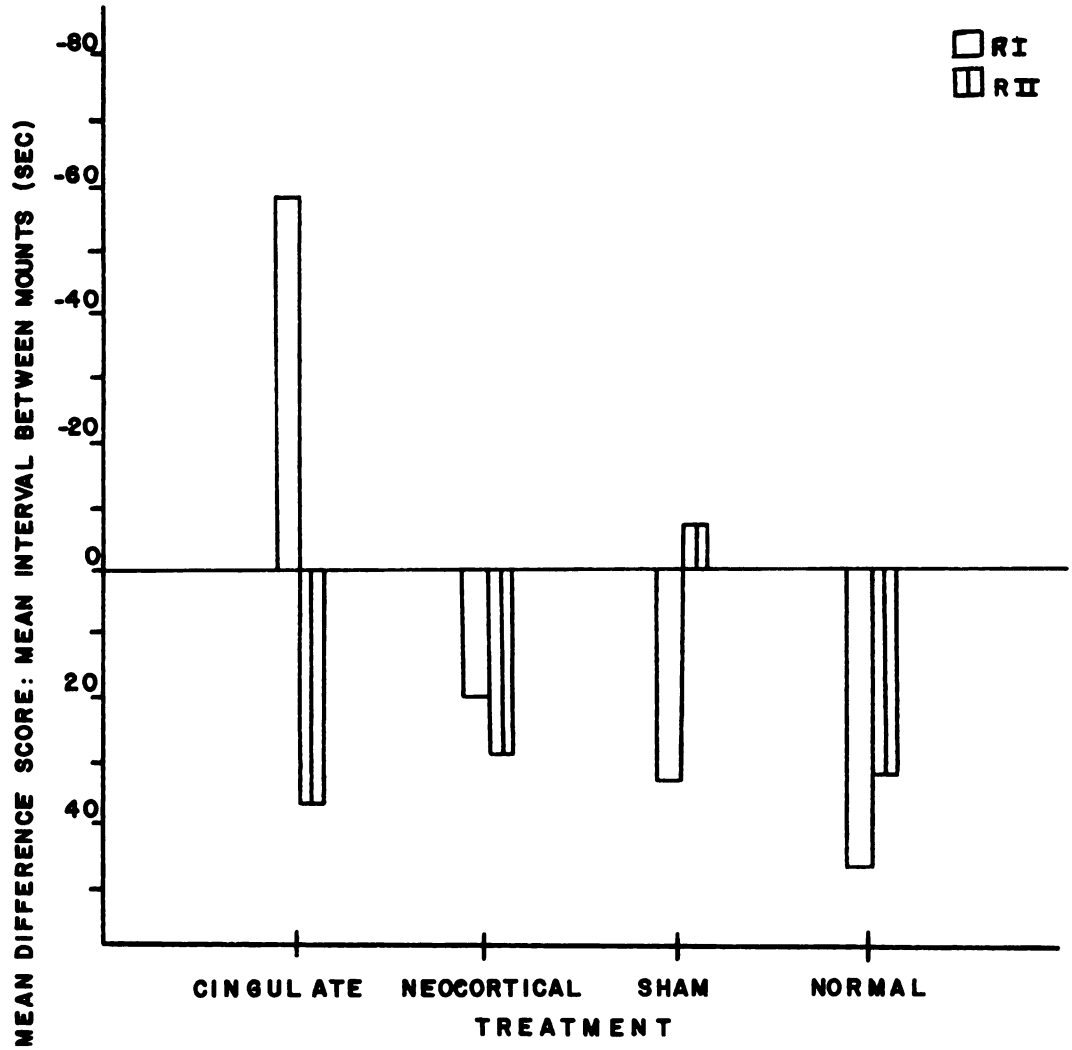

Figure 7. Mean difference score for preoperative and postoperative mean interval between mounts in replications I and II as a function of treatment group.

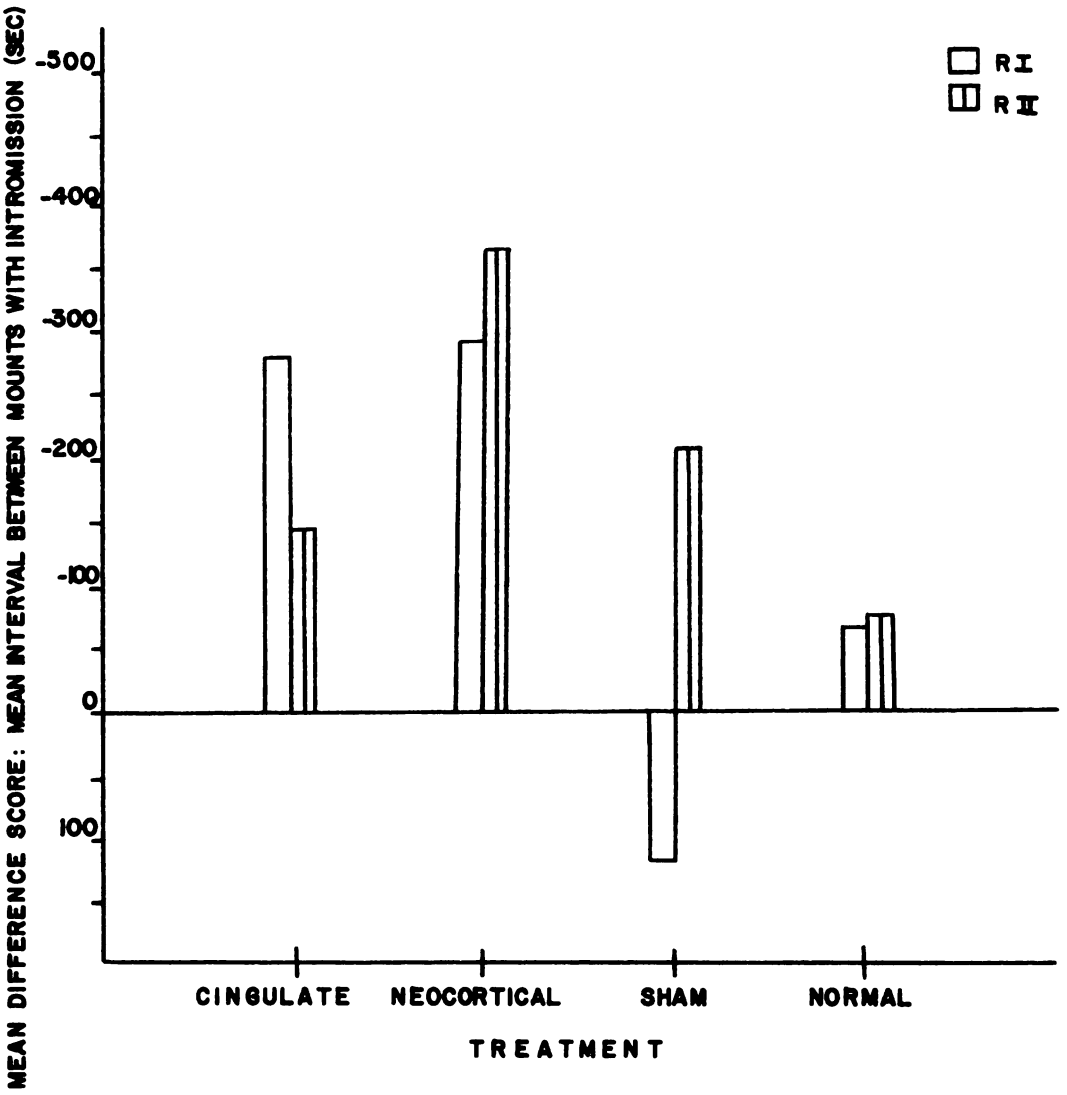

Figure 8. Mean difference score for preoperative and postoperative mean interval between mounts with intromission in replications I and II as a function of treatment group.

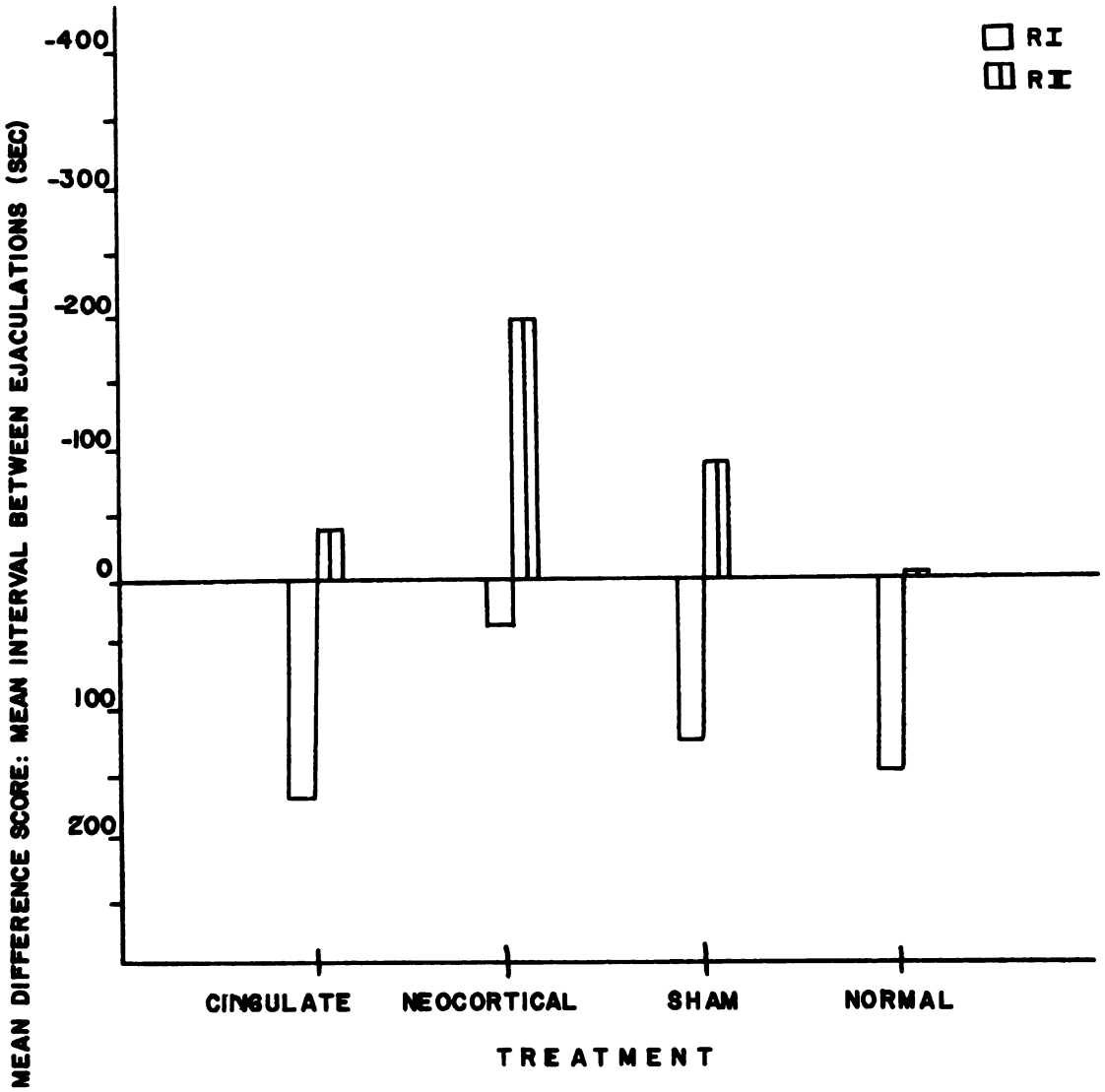

Figure 9. Mean difference score for preoperative and postoperative mean interval between ejaculations in replications I and II as a function of treatment group.

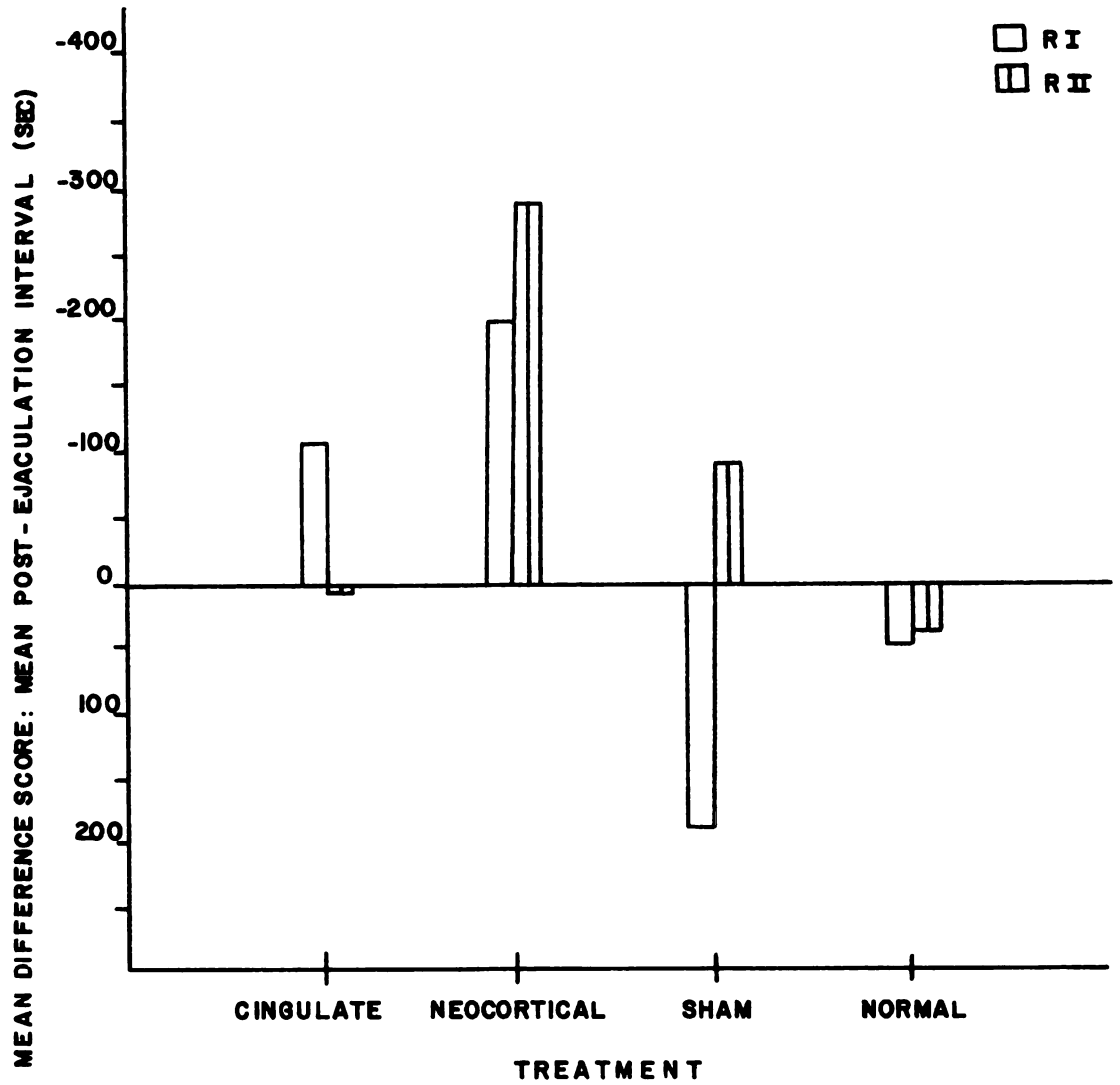

Figure 10. Mean difference score for preoperative and postoperative mean postejaculation interval in replications I and II as a function of treatment group.

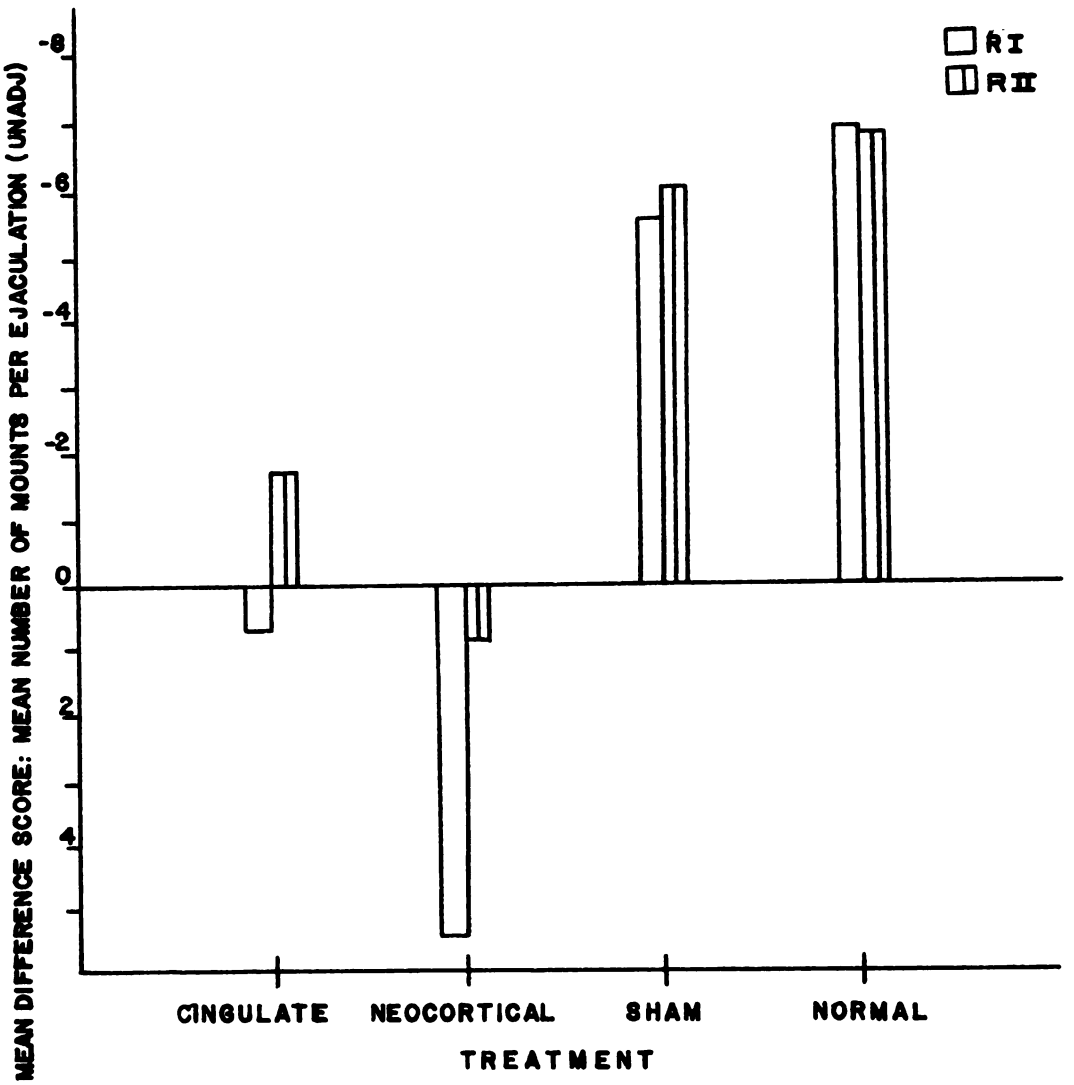

Figure 11. Mean difference score for preoperative and postoperative unadjusted mean number of mounts per ejaculation in replications I and II as a function of treatment group.

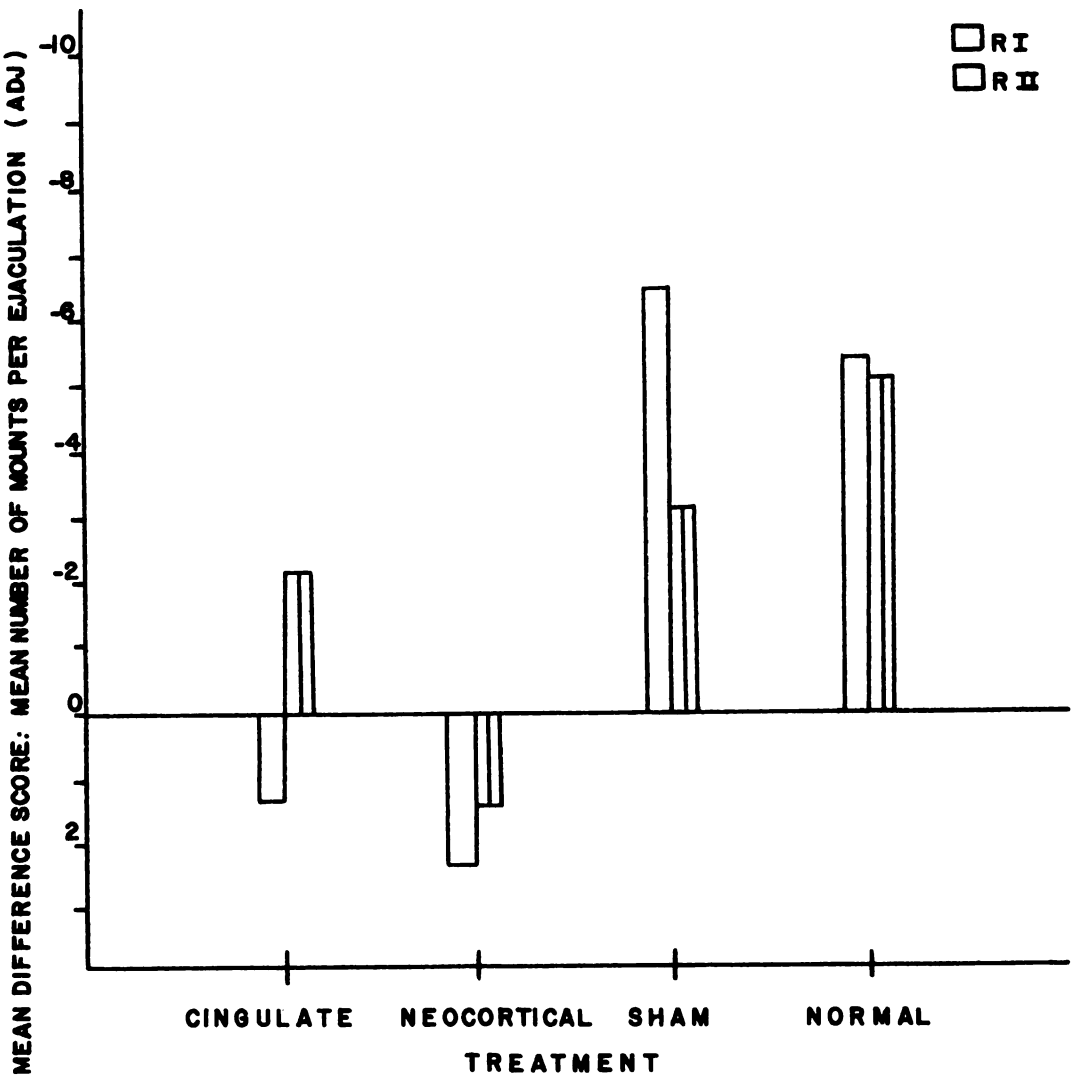

Figure 12. Mean difference score for preoperative and postoperative adjusted mean number of mounts per ejaculation in replications I and II as a function of treatment group.

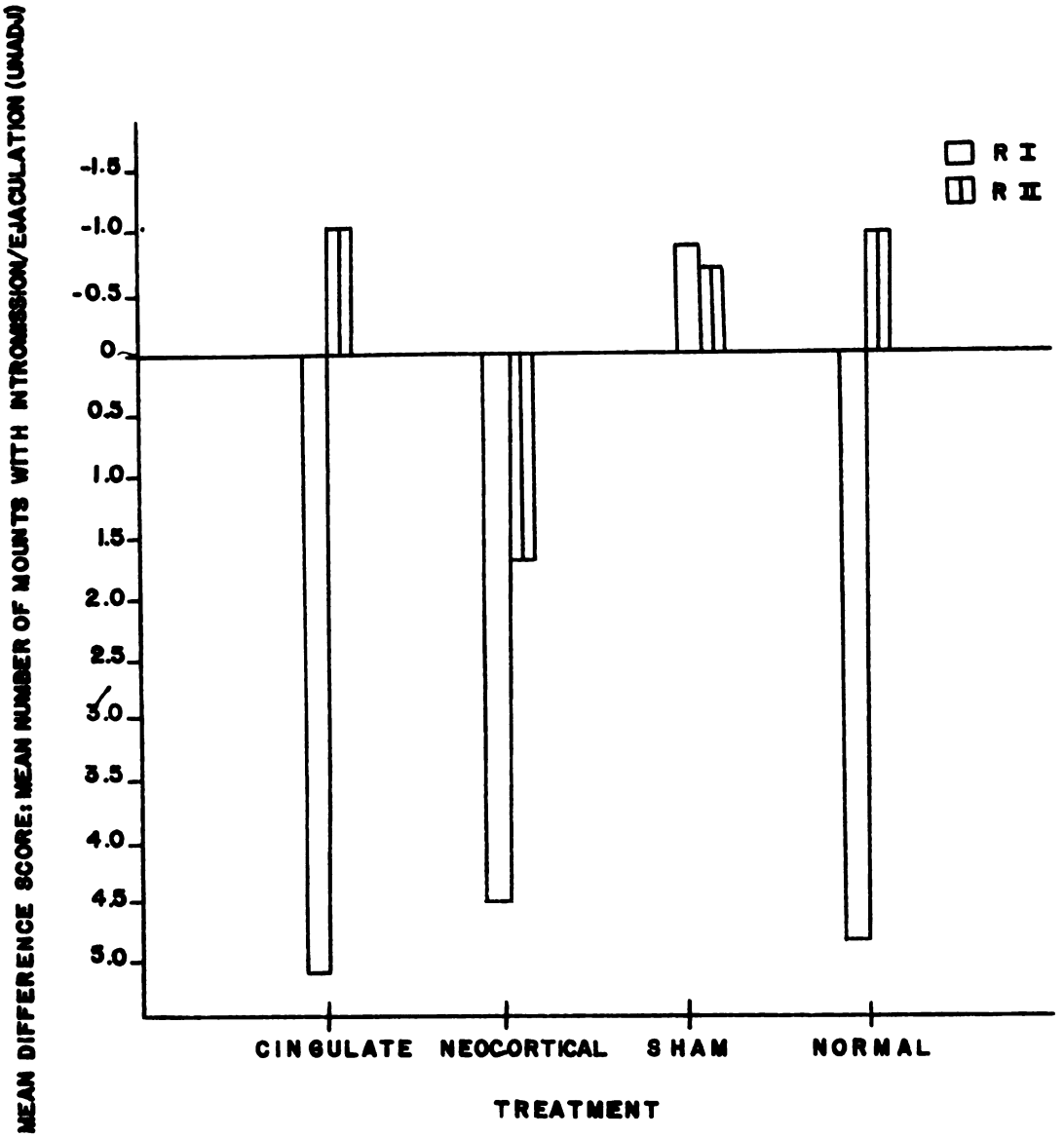

Figure 13. Mean difference score for preoperative and postoperative unadjusted mean number of mounts with intromission per ejaculation in replications I and II as a function of treatment group.

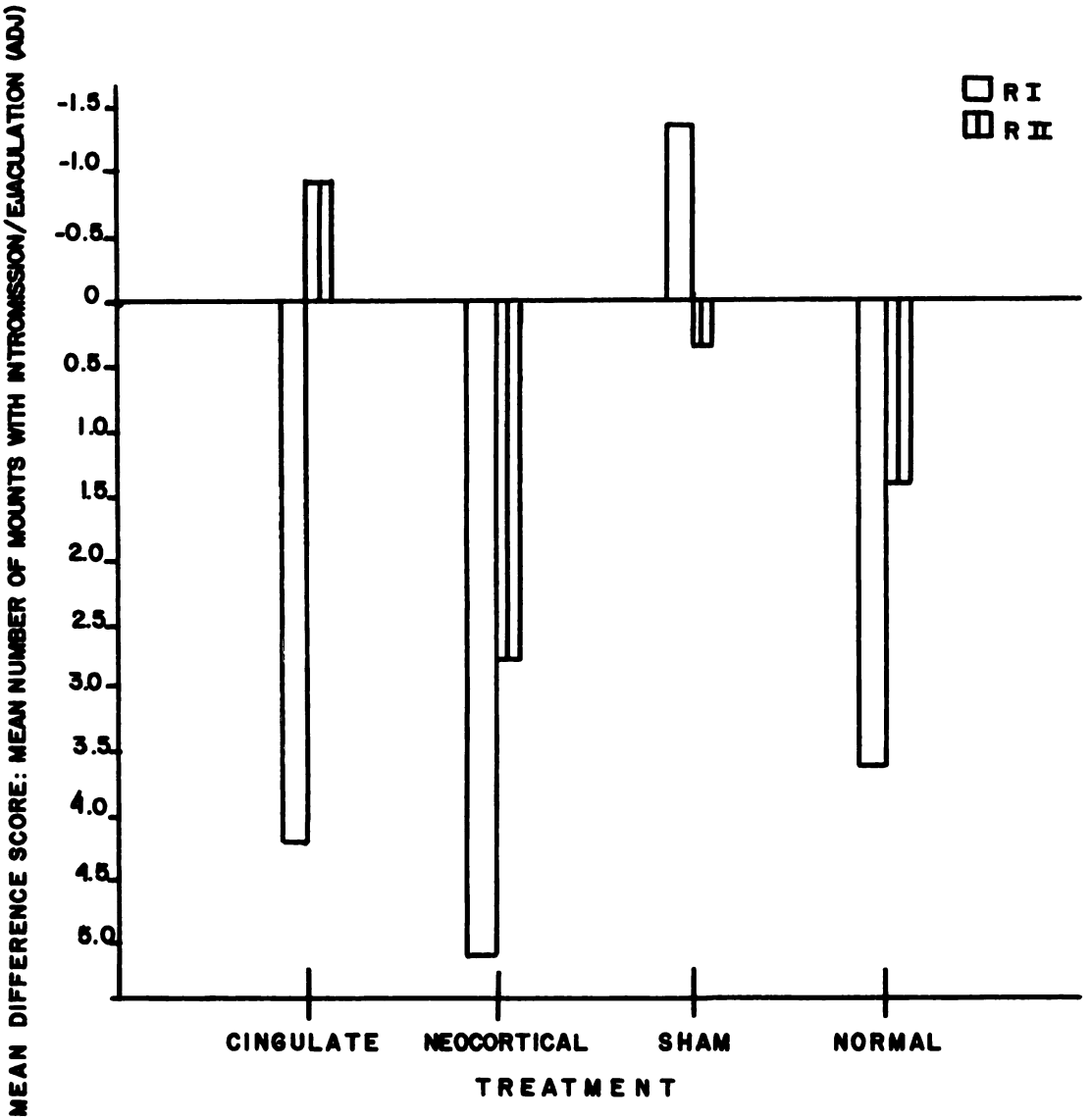

Figure 14. Mean difference score for preoperative and postoperative adjusted mean number of mounts with intromission per ejaculation in replications I and II as a function of treatment group.

Table 2

Results of unweighted-means two by four factorial analyses of variance. The harmonic mean is 4.6602.

Measure	Source	df	MS	F	p
Frequency of mounts	A(Replication)	1	5.050	0.120	
	B(Lesion Gp.)	3	85.396	2.024	
	AxB	3	14.473	0.343	
	Within cells	31	42.188		
Frequency of mounts with intromission	A(Replication)	1	49.902	1.704	
	B(Lesion Gp.)	3	7.981	0.273	
	AxB	3	16.482	0.563	
	Within cells	31	29.281		
Frequency of ejaculations	A(Replication)	1	2.583	10.320	.01
	B(Lesion Gp.)	3	0.403	1.609	
	AxB	3	0.151	0.602	
	Within cells	31	0.250		
Latency of mount	A(Replication)	1	9891.836	1.268	
	B(Lesion Gp.)	3	15453.830	1.981	
	AxB	3	13362.473	1.713	
	Within cells	31	7800.604		
Latency of mount with intromission	A(Replication)	1	143413.041	1.359	
	B(Lesion Gp.)	3	267732.974	2.533	
	AxB	3	88932.697	0.843	
	Within cells	31	105514.084		

Table 2 (cont'd.)

Measure	Source	df	MS	F	p
Latency of ejaculation	A(Replication)	1	627287.971	10.866	.01
	B(Lesion Gp.)	3	68635.437	1.189	
	AxB	3	7639.814	0.132	
	Within cells	31	57727.875		
Mean interval between mounts	A(Replication)	1	1339.031	0.151	
	B(Lesion Gp.)	3	4279.943	0.482	
	AxB	3	8118.665	0.914	
	Within cells	31	8881.004		
Mean interval between mounts with intromission	A(Replication)	1	42743.286	0.394	
	B(Lesion Gp.)	3	157491.949	1.450	
	AxB	3	83964.461	0.773	
	Within cells	31	108585.536		
Mean interval between ejaculations	A(Replication)	1	381823.604	7.978	.01
	B(Lesion Gp.)	3	48599.002	1.015	
	AxB	3	3020.723	0.063	
	Within cells	31	47857.880		
Mean post-ejaculation interval	A(Replication)	1	43767.649	0.567	
	B(Lesion Gp.)	3	176528.453	2.285	
	AxB	3	64421.810	0.834	
	Within cells	31	77255.535		
Mean mounts per ejaculation unadjusted	A(Replication)	1	32.694	0.386	
	B(Lesion Gp.)	3	205.207	2.423	
	AxB	3	10.395	0.123	
	Within cells	31	84.694		

Table 2 (cont'd.)

Measure	Source	df	MS	F	p
Mean mounts per ejaculation adjusted	A(Replication)	1	0.746	0.012	
	B(Lesion Gp.)	3	108.988	1.801	
	AxB	3	19.130	0.136	
	Within cells	31	60.524		
Mean mounts with intromission per ejaculation unadjusted	A(Replication)	1	124.313	3.649	
	B(Lesion Gp.)	3	26.230	0.770	
	AxB	3	21.346	0.627	
	Within cells	31	34.066		
Mean mounts with intromission per ejaculation adjusted	A(Replication)	1	36.863	1.613	
	B(Lesion Gp.)	3	32.432	1.419	
	AxB	3	18.807	0.823	
	Within cells	31	22.856		

latency to first mount with ejaculation data, frequency of ejaculation data, and interval between ejaculations data yielded significant F ratios for replication effect. Each of these replication effects involving a measure of ejaculation was significant at the .01 level.

Means and standard deviations for the 14 measures of preoperative and postoperative performance are presented in Table 3. Table 3 includes means and standard deviations for the following additional measures of behavior: mean mounts to ejaculation 1, mean mounts to ejaculation 2, mean intromissions to ejaculation 1, and mean intromissions to ejaculation 2.

Figure 1 shows that the only subjects failing to increase the frequency of mounts following surgery were those of replication I having neocortical lesions. The greatest increase in frequency of mounts for both replications occurred in animals subjected to sham operation procedures. In marked contrast, Figure 2 suggests that the only subjects failing to decrease the frequency of mounts with intromission following surgery were those subjected to sham operation procedures during replication I. The differences in frequency of ejaculation between subjects in replications I and II, shown in Figure 3, were large enough to be significant ($F_{1,31} = 10.320$). With respect to subjects showing the greatest deficits following surgery, the data summarized in Figures 2 and 3 are similar; i.e., in both cases the

Table 3

Means and standard deviations for preoperative and postoperative measures of performance

Measure	Replication	Cingulate $\bar{X}$	Cingulate SD	Cingulate n	Neocortical $\bar{X}$	Neocortical SD	Neocortical n	Sham $\bar{X}$	Sham SD	Sham n	Normal $\bar{X}$	Normal SD	Normal n
Frequency of mount	1-pre	11.5	6.3	15	9.2	7.7	9	10.0	9.3	12	12.3	8.0	18
	1-post	14.4	10.2		8.8	5.9		19.7	11.2		19.0	11.4	
	2-pre	8.1	3.0	15	8.5	4.0	15	17.0	8.3	15	14.7	12.6	18
	2-post	10.1	6.0		10.4	8.4		22.9	9.0		19.6	11.5	
Frequency of mount with intro.	1-pre	13.6	6.4	15	10.3	7.5	9	10.8	13.6	12	12.3	7.6	18
	1-post	10.5	7.0		8.9	9.0		12.8	5.4		11.9	7.4	
	2-pre	15.1	6.4	15	14.5	7.1	15	15.9	7.4	15	14.3	6.5	18
	2-post	12.7	8.1		10.7	9.5		12.2	9.4		12.1	7.6	
Frequency of mount with ejac.	1-pre	.9	.5	15	.9	.6	9	1.2	.8	12	.8	.6	18
	1-post	1.3	1.0		.8	1.0		1.6	.8		1.2	.8	
	2-pre	1.5	.8	15	1.3	.6	15	1.3	.8	15	1.2	.8	18
	2-post	1.3	.8		.9	1.0		.8	.7		1.2	.9	
Latency of mount	1-pre	90.9	156.3	15	61.9	65.8	9	50.7	57.0	12	66.4	120.6	18
	1-post	113.6	302.7		191.1	216.0		28.7	43.2		20.4	27.5	
	2-pre	31.7	41.7	15	43.2	61.4	15	35.5	33.7	15	27.8	38.5	18
	2-post	11.5	13.0		40.5	51.5		10.9	11.8		28.7	71.5	
Latency of mount with intro.	1-pre	162.7	165.4	15	282.7	402.1	9	399.3	450.8	12	277.8	364.8	18
	1-post	393.9	514.0		598.2	586.6		140.0	340.6		306.2	462.9	
	2-pre	102.1	305.3	15	134.1	302.7	15	203.7	394.6	15	183.1	380.4	18
	2-post	293.6	495.0		421.9	573.5		350.1	537.7		302.9	476.1	

Table 3 (cont'd.)

Measure	Replication	Cingulate $\bar{X}$	Cingulate SD	Cingulate n	Neocortical $\bar{X}$	Neocortical SD	Neocortical n	Sham $\bar{X}$	Sham SD	Sham n	Normal $\bar{X}$	Normal SD	Normal n
Latency of mount with ejac.	1-pre	854.4	293.4	15	830.7	312.5	9	681.3	356.6	12	857.6	313.6	18
	1-post	616.0	393.5		794.2	418.2		485.7	366.6		682.9	357.9	
	2-pre	549.6	345.8	15	611.2	266.7	15	695.7	336.8	15	633.1	347.4	18
	2-post	587.5	368.2		828.0	452.4		822.9	357.5		643.8	370.3	
Mean interval between mounts	1-pre	111.8	145.5	15	173.9	116.8	9	105.8	65.9	12	113.8	93.1	18
	1-post	170.3	292.4		153.7	153.3		72.1	44.6		66.8	28.9	
	2-pre	146.7	72.6	15	153.3	120.7	15	78.5	44.2	15	105.9	58.6	18
	2-post	110.2	57.6		120.8	79.4		86.2	122.5		73.4	57.4	
Mean int. bet. mts. w. intro.	1-pre	96.3	71.4	15	285.4	393.2	9	278.1	433.9	12	207.1	305.1	18
	1-post	376.2	517.4		577.8	594.3		163.8	327.8		273.3	431.4	
	2-pre	143.7	294.4	15	151.1	293.6	15	156.1	302.1	15	191.0	368.9	18
	2-post	293.2	471.6		509.9	574.2		365.7	523.6		268.2	431.4	
Mean int. bet. mts. w. ejac.	1-pre	866.5	272.6	15	846.0	292.6	9	704.1	335.4	12	880.7	281.9	18
	1-post	697.9	329.3		813.8	391.1		587.2	295.4		734.2	310.4	
	2-pre	618.9	296.7	15	654.3	231.8	15	754.1	275.5	15	668.7	315.3	18
	2-post	657.8	311.0		856.9	412.3		845.9	323.5		673.4	327.6	
Mean post ejac. int.	1-pre	435.9	329.8	15	511.1	409.1	9	538.0	418.4	12	570.3	414.7	18
	1-post	545.5	418.0		712.6	472.7		349.5	287.2		521.9	386.1	
	2-pre	476.1	307.2	15	435.5	223.7	15	483.5	381.1	15	522.2	371.1	18
	2-post	472.0	386.6		728.9	462.6		578.3	468.5		516.6	397.3	

Table 3 (cont'd.)

Measure	Replication	Cingulate $\bar{X}$	SD	n	Neocortical $\bar{X}$	SD	n	Sham $\bar{X}$	SD	n	Normal $\bar{X}$	SD	n
Mean mts. per ejac. unadj.	1-pre	10.6	13.0	13	8.3	7.5	7	10.2	11.1	9	8.3	5.2	13
	1-post	7.2	6.3	13	5.0	1.7	5	14.6	12.8	11	17.6	14.2	14
	2-pre	5.5	3.0	13	7.1	4.5	14	11.2	7.8	12	8.8	7.4	14
	2-post	7.2	5.1	12	7.6	3.5	8	23.9	11.4	10	16.3	21.3	14
Mean mts. w. intro. per ejac. unadj.	1-pre	16.2	6.0	11	11.9	5.5	7	9.2	4.6	9	14.2	6.6	13
	1-post	8.6	2.4	11	11.2	8.0	5	9.4	5.0	11	10.9	3.4	14
	2-pre	10.7	5.5	13	12.5	6.7	14	12.4	5.0	12	10.9	3.7	14
	2-post	10.8	6.2	12	13.4	6.9	8	16.1	5.9	10	10.9	5.7	14
Mean mts. per ejac. adj.	1-pre	6.4	6.8	13	6.1	2.4	7	7.2	6.0	9	7.1	4.4	13
	1-post	6.7	5.6	13	7.6	5.6	5	12.5	11.9	11	14.9	13.1	14
	2-pre	4.0	1.7	13	5.6	3.1	14	10.4	7.1	12	6.8	6.6	14
	2-post	6.3	4.8	12	5.9	3.5	8	18.2	10.0	10	12.2	11.6	14
Mean mts. w. intro. per ejac. adj.	1-pre	9.9	6.0	11	9.7	5.2	7	7.7	3.0	9	11.3	5.0	13
	1-post	7.9	1.7	11	7.0	3.9	5	8.4	4.3	11	9.6	2.2	14
	2-pre	9.3	3.4	13	11.3	6.7	14	11.8	4.0	12	9.9	3.0	14
	2-post	9.8	4.9	12	10.8	4.3	8	16.1	5.9	10	8.6	3.4	14
Mean mts. per ejac.$_1$	1-pre	9.4	6.2	13	5.6	4.1	7	7.9	5.6	9	7.7	4.7	13
	1-post	7.5	6.2	11	7.6	5.5	5	12.2	12.5	11	15.3	12.3	14
	2-pre	4.3	1.5	13	6.1	3.5	14	9.7	7.7	12	7.7	6.4	14
	2-post	6.0	4.9	12	6.8	3.5	8	18.5	9.6	10	12.2	11.8	14

Table 3 (cont'd.)

Measure	Replication	Cingulate $\bar{X}$	SD	n	Neocortical $\bar{X}$	SD	n	Sham $\bar{X}$	SD	n	Normal $\bar{X}$	SD	n
Mean mts. per ejac.$_2$	1-pre	5.0	0.0	1	14.0	0.0	1	2.0	2.3	5	6.0	5.6	2
	1-post	6.5	2.3	8	3.0	0.0	1	6.9	4.6	7	5.1	3.2	7
	2-pre	3.4	2.4	8	2.2	1.3	6	6.6	3.3	7	1.9	1.6	8
	2-post	5.0	3.5	8	2.5	0.6	4	8.5	7.8	2	6.9	3.3	7
Mean mts. w. intro. per ejac.$_1$	1-pre	12.7	5.9	13	9.7	5.2	7	8.6	4.5	9	11.8	4.9	13
	1-post	8.9	2.2	11	7.4	3.8	5	9.6	4.2	11	10.8	2.4	14
	2-pre	10.4	3.7	13	11.7	6.4	14	12.2	4.8	12	11.6	3.5	14
	2-post	11.2	5.1	12	11.8	4.3	8	14.3	4.3	10	9.1	3.9	14
Mean mts. w. intro. per ejac.$_2$	1-pre	6.0	0.0	1	9.0	0.0	1	5.2	2.3	5	7.5	0.7	2
	1-post	6.0	1.1	8	4.0	0.0	1	4.7	1.0	7	6.6	2.0	7
	2-pre	6.1	2.5	8	5.7	3.3	6	7.7	4.8	7	5.4	2.1	8
	2-post	6.1	3.8	8	6.2	1.5	4	8.5	3.5	2	6.9	2.5	7

greatest deficits occurred during replication II in animals belonging to the neocortical and sham operation groups.

Figure 4 shows that only slight changes occurred in latency to first mount for all subjects except those from replication I having neocortical lesions, the latter subjects showing a relatively large postoperative increase in latency to first mount without intromission. The data summarized in Figure 5 suggest that only those animals subjected to sham operation procedures during replication I had shorter latencies to first mount with intromission after surgery than they did prior to surgery. The greatest increase in latency to first mount with intromission occurred in the neocortical lesion groups. Analysis of the data summarized in Figure 6 indicated that the subjects of replication I differed significantly ($F_{1,31} = 10.866$) from those of replication II with respect to the difference in latency to first ejaculation before and after surgery. The animals in replication I showed postoperative decreases in latency to first ejaculation whereas replication II animals showed postoperative increases in latency to first ejaculation, the greatest postoperative changes appearing in the cingulate and neocortical groups.

As shown in Figure 7, the mean interval between mounts decreased postoperatively for all subjects except those in the replication I cingulate group and the

replication II sham group, the increase for the sham animals of replication II being slight relative to the increase shown by the cingulate subjects of replication I. In contrast to the data presented in Figure 7, the data summarized in Figure 8 show that the mean interval between mounts with intromission increased during postoperative sessions for all subjects except those in the sham group of replication I, the greatest postoperative increases occurring in the neocortical groups. Analysis of the mean interval between ejaculations difference scores yielded an F ratio significant at the .01 level ($F_{1,31} = 7.978$) for replication effects. Figure 9 clearly suggests that the subjects of replication I showed a shorter postoperative mean interval between ejaculations while the replication II subjects had a longer mean interval between ejaculations after surgery.

After any ejaculation, regardless of when it occurred during the 20 minute session, the animal remained in the observation box until the next mount occurred. The data presented in Figure 10 suggest that neocortical animals showed the greatest postoperative increases in mean postejaculation interval, a similar postoperative change in the opposite direction being shown by the replication I sham subjects.

The data presented in Figure 11 represent the difference scores for unadjusted mean number of mounts

per ejaculation, the greatest increases with respect to this measure of sexual behavior occurring in the normal groups and the greatest decreases in the neocortical groups. When the difference score for mean number of mounts for any subject during any session was based on only those mounts occurring prior to the last ejaculation for that session a difference score called the adjusted mean number of mounts per ejaculation resulted. Figure 12 shows that adjusting the mean difference scores for mean number of mounts per ejaculation resulted in a decrease in amount of postoperative change without altering the basic trends shown in Figure 11.

The apparent differences between replications I and II with respect to difference scores for unadjusted mean number of mounts with intromission per ejaculation, shown in Figure 13, were not statistically significant. Only the sham animals of replication I and the replication II neocortical animals failed to conform to the general trend of postoperative increases in unadjusted mean number of mounts with intromission per ejaculation for replication II subjects and decreases in this measure for replication I subjects. When the score for mean number of mounts with intromission per ejaculation was adjusted, as described for adjusted mean number of mounts per ejaculation, the general trends shown in Figure 13 were not preserved. As shown in Figure 14, the only subjects failing to show a decrease in adjusted mean number of

mounts with intromission per ejaculation were the replication II cingulates and the replication I sham operates.

Due to the infrequency of occurrence of mounts with intromission not followed by autogenital cleaning, the autogenital cleaning data were not statistically analyzed. Only 11 of the males made at least 1, and less than 3, mounts with intromission without the typical autogenital cleaning, 7 of these males being observed during replication I and 4 during replication II. All lesion groups were represented by the occasional absence of autogenital cleaning. That is, 4 of the males were from the cingulate groups, 2 were from the neocortical groups, 2 were from the replication I sham group, and 3 were from the normal groups. These males made between 44 and 115 mounts with intromission during the 6 sessions, 9 responses without autogenital cleaning occurring during preoperative sessions and 7 responses without autogenital cleaning occurring during postoperative sessions. No trends were observable in the mounts with intromission not followed by autogenital cleaning data.

The experimenter was unable to detect signs of motor deficits in any of the males following surgery. Observation of qualitative aspects of behavior suggested that there were only minor postoperative departures from normal, i.e., preoperative, sexual behavior. That is, during the first postoperative session animals 18

(cingulate) and 19 (neocortical) tended to fall back and to the side during autogenital cleaning. Animals 7 (cingulate) and 3 (sham) showed minor departures from the typical preoperative autogenital cleaning described for subjects 18 and 19. Notes on behavior, taken by E as each rat was observed, fail to suggest that the subjects in either of the lesion groups were unable to carry out the normal sexual responses in the normal order.

Body weight data collected on alternate days before surgery and after convalescence from surgery fail to support the notion that the animals were sick during postoperative sessions. No animals weighed less during the postoperative sessions than they did on the first day of the experiment. Only 2 males in replication I, 1 cingulate and 1 normal, showed weight losses between the last two sessions. Transitory slight weight losses occurred between the last two sessions in 3 replication II subjects, 2 cingulates and 1 neocortical. Because the subjects were maintained on Wayne Mouse Breeder Blox, it was occasionally the case that all food particles slipped through the openings in the bottoms of the cages. Thus, slight transitory weight losses could be attributed to the brief absence of food.

DISCUSSION

The results of the present experiment appeared to provide further support for Beach's (1940, 1941) claim that destruction of less than 20 percent of the cortex does not result in a disruption of the sexual behavior of adult male rats. Although the lesion effects reported in the present experiment were not statistically significant, Figures 2, 3, 4, 5, 6, 8, 9, 10, 11, and 14, reflecting several measures of sexual behavior, showed that neocortically lesioned rats tended to change more following surgery than did rats suffering cingulate lesions. The relatively large behavioral changes obtained following neocortical lesions might be interpreted as constituting no evidence contrary to Larsson's (1964) finding that lateral cortical lesions were more detrimental with respect to mating behavior in male rats than were lesions of the median cortex.

The results failed to provide further confirmation of the work of Stamm (1954), Bunnell and Pinder (1964), Bunnell, et al. (1966), Stamm (1955), and Slotnick (1967). More specifically, the results of the reported experiment could not be interpreted as evidence supporting the hypothesis that the cingulate cortex is an

important structure with respect to typical instinctive behaviors. Since the investigators obtaining evidence supporting the existence of a relationship between cingulectomy and behavioral disruptions were not investigating sexual behavior in the adult male rat, except for the study of Michal (1965) discussed by Thomas, Hostetter, and Barker (1968), one might conclude that the results of the present experiment were merely irrelevant with respect to the instinct studies. Thus the results appeared to confirm, weakly in the case of Larsson (1964), the reports of investigations involving sexual behavior in male rats whereas the studies involving subjects other than rats and/or non-sexual measures of behavior were not confirmed. The results reported in this experiment are also not consistent with the results found by Barker and Thomas (1965, 1966) in their investigations of acquisition and retention of alternation behavior following cingulectomy. Thus, it is concluded that the present experiment has failed to yield evidence supporting the hypothesis that mechanisms of temporal-response integration might be impaired by cingulectomy. It is conceivable that the small amount of cingulate tissue spared in most cingulate subjects accounts for the fact that the present evidence does not confirm the results reported by Stamm (1954), Bunnell and Pinder (1964), Bunnell, et al. (1966), Stamm (1955), Slotnick (1967), Michal (1965), and Barker and Thomas (1965, 1966).

One might focus upon experimental procedures in attempting to account for the obtained results. Although the experimenter intended to use preoperative session one as a period for selecting responsive males and allowing the males to gain sexual experience, observations during the first and second replication I preoperative sessions resulted in elimination of the extra session. Since all sessions, including session one, were conducted under conditions as nearly identical as possible, the observation that many males showing a high degree of responsiveness (one or two ejaculations) in the first session made few or no sexual responses during session two resulted in no major experimental changes. Replication II was also conducted without the extra selection and experience session. Because the sessions lasted only 20 minutes and no rat ejaculated more than three times per session it does not appear reasonable to assume that the males had become sexually satiated two or three days earlier during session one. This conclusion was based on the results of an investigation of sexual exhaustion and recovery from exhaustion in the male rat reported by Beach and Jordan (1956). Beach and Jordan (1956) found that fully rested males reached the sexual exhaustion criterion, which consisted of no mounting for 30 successive minutes, after an average of 89.2 minutes (range of 61.5 to 141.5 minutes). Beach and Jordan (1956) also found that the mean number of ejaculations to

the exhaustion criterion was 6.9 (range of 5 to 10 ejaculations). In terms of the criterion established by Beach and Jordan (1956), the males in the present experiment had no opportunity to become sexually exhausted.

One might conclude that the present results do not constitute sufficient reason for pursuing this line of research. Although more precise techniques of destroying brain tissue might lead to more conclusive results, only minor procedural changes might be in order.

Due to severe time and space limitations, only 4 or 5 receptive stimulus females were available for 10 to 12 males on any given day. Although the females were used no more than three times on a given day and at least 90 minutes intervened between successive pairings, a preferable procedure would have involved the use of equal numbers of experimental males and receptive stimulus females.

During pilot observations the experimenter was unable to detect any changes in behavior following the replacement of the used cobmeal by fresh cobmeal. Since the females were tested for receptivity soon after the cobmeal was replaced each day and since all sessions were preceded by a 10 minute adaptation session, no male rat was tested in an environment free of olfactory stimuli from previous rats. A preferable procedure would have involved the use of fresh cobmeal for each experimental

rat during each session.

A click occurred each time one of the remote control panel buttons was depressed. That is, the measurement of any response was accompanied by a click. Since the animals were housed in the experimental room and in close proximity to the observation box, this extraneous source of auditory stimulation was not regarded as an important variability. However, the use of a silent control panel would have eliminated the possibility of auditory contamination.

A further procedural defect involved the speed at which the Esterline Angus Recorder was operated. A paper speed of 3.8 cm. per minute was selected because such a slow speed eliminated the possibility of running out of paper while a rat was being observed. This problem could be eliminated by using a different recording device or by improving the paper markings. A faster paper speed would allow finer time measurements than the four second minimum used in the present experiment.

The 1204 second time limit for latency measurements during sessions in which no responses occurred was selected because any given session, with the exception of longer sessions used to permit measurements of postejaculatory interval, lasted only 1200 seconds. Selection of some other latency might have led to different results.

Although any of these defects might have

influenced the results, it is unlikely that they would have obscured large postoperative changes in the sexual behavior of cingulectomized rats.

APPENDIX A

APPENDIX A

Table 4

Raw data: body weight in grams

S	Preoperative weighings 1	2	Postoperative weighings 1	2	3
1	443	465	392	435	450
2	325	338	327	357	360
3	365	360	375	384	389
4	353	367	420	421	425
6	405	407	423	437	447
7	428	434	370	418	449
8	354	360	396	407	411
9	331	339	346	356	356
10	332	343	379	392	394
11	375	379	411	416	421
12	353	362	374	377	359
13	348	360	380	377	395
14	359	368	391	397	399
15	366	372	420	413	404
17	352	360	401	408	415
18	334	351	392	393	403
19	334	348	367	377	380
22	384	394	422	429	438
23	300	312	343	352	351
24	378	378	384	390	383
25	349	365	402	410	414
26	336	342	382	390	394
27	347	363	397	410	419
28	348	363	351	365	345
29	331	340	363	365	372
30	336	371	435	443	455
31	347	368	370	378	364
32	357	361	396	409	409
33	312	326	360	365	369
34	326	335	369	383	402
35	353	364	414	421	431
36	347	349	371	372	382
37	355	358	397	401	408
38	345	358	417	424	429
39	324	325	337	332	336

Table 4 (cont'd.)

S	Preoperative weighings 1	2	Postoperative weighings 1	2	3
40	378	384	394	405	409
41	364	374	378	383	393
42	324	334	362	367	379
43	340	341	363	367	386

APPENDIX B

APPENDIX B

Table 5

Raw data: autogenital cleaning (a) and interresponse times (irt) in seconds for mounts (m), mounts with intromission (mi), and mounts with ejaculation (me).

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
cing 2		m	64	m	4	m	48	mia	16	m	72
Rep. 1		mia	4	mia	12	m	32	mia	24	m	120
Pre-1		mia	114	mia	44	m	16	mia	28	mia	52
m	48	mia	32	mia	52	m	28	mia	12	m	20
m	8	mia	60	mia	20	m	4	mea	24	mi	8
mia	4	mia	120	mia	28	mia	4	m	424	mia	56
mia	84	mia	118	mia	48	mia	16	m	20	mea	88
mia	84	mia	8	m	48	mia	24	mia	8	mia	188
mia	124	mea	76	mea	4	m	36	mia	24		
mia	76					mia	24	mia	28	Pre-2	
mia	80	Pre-3		Post-1		mia	28	mia	36	m	24
mea	88	m	4	m	52	mia	40	mia	36	m	4
mia	444	m	8	m	12	m	28	m	36	mia	4
mia	36	mia	4	m	28	mia	28	mia	32	m	8
mia	68	mia	4	mia	4	mia	20	mea	48	m	24
		m	8	mia	20	mia	32			mia	8
Pre-2		mia	24	mia	24	mia	48			m	8
m	48	m	16	mia	32	mia	28	cing 6		mia	36
mia	44	mia	12	mia	48	m	28	Rep. 1		mia	24
m	32	mia	20	mia	52	mea	28	Pre-1		mia	20
mia	8	mia	16	mia	36	m	268	m	52	mia	24
m	68	m	20	mia	92	mia	216	m	16	mia	16
mia	16	m	36	mea	60	mia	20	m	20	m	20
mia	12	mia	4	m	456			mia	20	mia	8
mia	16	mia	28	mia	56	Post-3		m	12	mia	148
m	56	mia	24	mia	24	m	8	m	24	mia	104
mia	16	mia	20	mia	72	mia	4	mia	12	mia	56
mia	8	mia	16	mia	100	mia	16	m	84	mia	96
mia	20	mia	24			mia	20	mia	4	mia	128
mia	28	m	20	Post-2		mia	36	m	12	mia	16
m	28	mea	8	m	8	mia	32	mia	56	m	48
m	64	m	364	m	64	mia	44	mia	44	mia	32
mia	12	m	20	m	16	mia	28	mia	132	mia	40
mia	8	m	36	m	68	mia	24	mia	32	mea	40

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
Pre-3		m	24	m	4	mia	16	mia	104	m	36
m	80	mia	24	m	16	mia	28	mia	40	mia	28
m	4	mia	16	m	8	m	32	mia	28	mia	24
m	16	mia	24	m	12	mea	24	mia	8	mia	28
m	32	m	16	m	152					mia	20
m	16	mia	16	m	8			Pre-3		m	20
m	28	mi	12	m	4	cing 7		m	4	m	12
m	4	mia	8	m	4	Rep. 1		m	4	m	8
m	40	mea	12	m	4	Pre-1		mia	8	mia	16
m	56	m	184	m	24	mia	48	mia	12	m	40
m	40	m	44	m	52	mia	148	m	144	m	4
m	36	m	32	m	8	mia	140	m	8	mia	4
m	20	m	12	m	12	mia	120	m	96	mea	12
m	24	m	24	m	8	mia	168	mia	12		
m	28	mia	72	m	60	m	8	mia	68	Post-2	
m	12	m	24	m	128	mia	52	mia	8	m	32
mia	20	m	4	m	4	mia	28	mia	112	m	16
mia	16	mia	4	m	12	mia	80	mia	36	m	4
mia	52	mia	20	m	8	mea	72	m	72	m	4
mia	20	mia	32	m	112			mia	4	m	4
m	24	mia	28			Pre-2		mia	96	m	8
mia	28	mea	24	Post-3		m	28	mia	48	m	20
mia	12			m	4	m	40	mia	12	m	36
mia	36	Post-2		mia	4	m	24	mia	132	m	16
m	24	m	20	m	4	m	52	mea	36	m	40
mia	4	m	4	m	20	m	104			m	36
mia	28	m	12	m	16	m	24	Post-1		m	40
mia	36	m	4	m	24	m	28	m	56	m	4
mia	16	m	8	m	16	m	4	m	4	m	16
mia	20	m	32	mia	20	m	4	mia	12	m	52
mia	20	m	12	mia	36	m	44	m	12	mia	4
mia	28	m	12	mia	36	m	8	mia	8	m	4
mea	24	m	4	m	28	m	4	mia	92	m	88
m	248	m	16	m	28	m	72	mia	20	m	16
		m	4	mia	12	mi	4	mia	24	m	4
Post-1		m	8	mia	28	mia	12	mia	52	m	4
m	48	m	60	mia	12	mia	28	mia	12	mia	4
mia	28	m	32	m	28	mia	20	mia	20	m	32
mia	20	m	48	mea	4	mia	20	mia	16	mia	4
mia	12	m	8	m	192	mia	44	m	16	m	24
m	12	m	12	m	140	mia	128	m	4	mia	8
m	20	m	24	m	28	mia	112	m	8	mia	44
mia	8	m	80	m	20	m	4	m	8	mia	24
mea	24	m	48	m	28	mia	24	mea	4	mia	24
m	168	m	48	mia	4	mia	144	m	284	mia	56
m	76	m	4	mia	24	m	24	m	76	mea	24
m	8	m	16	m	44	mia	4	mia	48		

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
Post-3		mia	8	m	24	m	12	m	16	m	92
m	8	m	56	mia	20	mia	44	mia	4	mia	4
mia	4	m	24	mia	40	mia	16	mia	32	m	32
m	8	m	24	m	12	m	12	m	28	mia	4
m	8	m	8	mia	4	mia	12	mia	4	m	52
mia	40	m	56	mia	32	m	20	mia	48	mia	40
m	32	m	144	m	16	m	20	m	20	m	56
m	40	m	16	mea	8	mia	24	m	4	mia	4
mia	16	m	92	m	352	m	16	mia	20	mia	8
mia	48	m	32	m	20	mia	8	mia	32	mia	40
m	20	m	8	mia	12	mia	32	mia	16	mia	48
mia	28	m	60	mia	20	m	24	mia	12	mia	4
mia	32	m	68	mia	28	m	8	mia	24	mia	36
m	24	m	4	mia	40	m	8	mia	12	m	52
mia	8	m	32	mia	20	mea	4	mia	12	mia	28
mia	36	mia	16	mia	20	m	432	mia	16	mia	68
m	20	mia	28	mia	32	m	4	mia	40	mia	24
m	8	mia	24	m	40	m	16	mia	32	mea	32
mea	4	mea	32	m	20	m	32	m	44	m	328
m	372			mia	8	mia	4	mia	20	m	4
m	48	Pre-2		m	20	mia	40	m	36		
m	4	m	40	m	8	mia	44	mia	4	Pre-3	
mia	4	m	20	m	4	mia	20	mia	36	m	20
mia	32	m	40	mia	4	mia	56	mia	28	m	28
mia	44	m	20			m	16	m	28	m	4
m	32	m	4	Post-1		mia	20	mia	8	m	8
mia	24	m	124	m	76	m	24	mia	16	m	24
m	28	m	80	m	32	m	4	mia	24	m	4
mia	32	m	72	m	164	m	8	mia	56	mia	4
m	36	mia	4	m	60	m	4	m	12	mia	56
m	4	m	140	m	444	mea	8	mia	4	m	28
mea	4	m	24	m	140			mea	4	mia	76
		mia	12	m	152	Post-3				mia	32
cing 12		m	208	m	16			Pre-2		mia	36
Rep. 1		m	104	m	8			m	100	mia	56
Pre-1		m	292	m	96	cing 18		m	8	mia	20
m	156					Rep. 1		m	4	mia	4
m	28	Pre-3		Post-2		Pre-1		m	4	m	40
m	44	m	4	m	88	m	124	m	4	mia	4
m	42	mia	8	mia	4	m	4	mia	28	m	12
m	24	mia	24	mia	20	mia	20	m	4	m	88
mia	84	mia	20	m	20	mia	24	mia	8	mia	4
m	8	m	12	m	12	m	16	m	24	m	24
m	4	mia	8	mia	12	mia	20	m	4	mia	4
m	60	mia	20	mia	24	m	52	m	16	m	16
m	4	mia	28	mia	24	mia	24	m	28	mea	8

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
m	328	Post-2		Pre-1		m	12	m	432	m	168
m	12	m	20	m	52	mia	4	m	4	m	12
m	116	m	28	mia	36	m	16	mia	4	mia	12
m	12	m	44	m	12	mia	32	mia	12	mia	168
m	4	m	656	mia	356	mia	24	mia	20	mia	64
mia	4	m	32	mia	124	m	24	mia	40	mia	120
m	24	m	148	mia	16	mia	52	mea	16	mea	32
m	8	m	44	mia	112	mia	8			m	308
mia	4	m	12	mia	224	mia	4	Post-2			
mia	32	m	4	mea	28	m	20	m	40	Pre-2	
		m	32	mia	64	m	4	m	4	m	140
Post-1		m	84	mia	8	mea	20	m	16	m	4
m	32	m	8	m	16	m	384	m	32	m	96
m	4			mia	12	m	20			m	32
m	4	Post-3				m	36	Post-3		m	32
mia	4	m	48	Pre-2		m	4	mia	72	m	80
mia	24	mia	12	m	64	mia	4	mia	48	m	100
mia	32	mia	8	m	164	m	40	mia	12	m	172
mia	48	m	16	m	788	m	8	mia	32	mia	4
mia	28	mia	16	m	136	m	4	mia	48	m	24
mia	24	mia	20	m	4	mia	8	mia	44	m	244
mia	40	mia	16			m	28	mia	24		
mia	24	mia	20	Pre-1		mia	16	m	32	Pre-3	
mia	36	mia	20	m	8	m	16	m	24	m	8
mia	16	mia	12	mia	8	m	12	m	12	m	96
m	28	mia	12	mia	8			mia	8	mia	8
mea	4	mia	20	m	20	Post-1		m	40	mia	24
m	152	mea	12	m	4	m	40	mia	12	m	24
m	32	m	332	mia	20	mia	16	mea	32	mia	12
m	32	m	28	m	16	mia	20	mia	468	mia	28
m	52	mia	11	mia	28	mia	12	m	20	mia	20
m	32	mia	24	m	20	mia	12	m	40	m	12
m	4	mia	28	mia	16	mia	32	mia	8	mia	24
m	4	mia	20	mia	16	mia	16	mia	20	m	20
mia	4	mia	24	m	8	m	16	mia	36	m	24
mia	52	mia	20	mia	12	mia	12	mia	16	mia	16
mia	48	m	16	m	12	m	32	m	48	mia	36
mia	36	mia	8	mia	12	mea	8	mia	36	mia	16
mia	44	m	24	m	44	mia	344			mia	52
mia	32	mea	4	mia	4	m	12			m	276
mia	40	m	280	mia	12	mia	8	neo 14		m	20
m	24	m	60	mia	16	m	12	Rep. 1		m	20
m	16			m	60	mia	12	Pre-1		m	24
mea	12			mia	4	mia	16	m	188	mia	8
m	180	neo 9		mia	20	m	16	m	108	mia	24
m	72	Rep. 1		mia	16	mea	12	mia	4	m	36

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	8	m	28	mia	12	mia	44	mia	60	Pre-3	
m	16			m	16	mia	88	mia	40	m	48
m	40			m	4	mia	28	mia	36	m	24
mia	8	neo 19		m	48			m	284	m	24
mia	20	Rep. 1		mia	8	Post-2		mia	68	m	8
m	24	Pre-1		m	40	m	16	mia	28	m	40
mia	16	m	84	mia	4	m	12	mia	36	m	48
m	36	m	40	mia	36	m	24	mia	36	m	100
m	8	mia	4	m	88	m	40	mia	32	m	148
m	4	m	64	mia	4	m	44	mia	32	m	56
mia	4	m	4	mia	52	m	12	mia	52	mia	76
mia	8	mia	4	mia	60	m	52	mia	28	m	24
m	20	mia	108	mia	60	m	60	mia	24	mia	12
mia	24	mia	60	mea	24	m	24	mia	36	mia	12
m	44	mia	128	m	328	m	4	mia	36	mia	40
m	4	mia	116	m	228	m	76	mia	24	m	16
mea	4	mia	96	mia	4	m	40	mia	32	mia	12
		mia	104	m	48	mia	4	m	24	m	20
Post-1		mia	144	mia	12	m	48	mia	24	m	4
m	476	m	8	mia	108	m	4	mia	20	m	24
m	16	mea	96	Post-1		m	12	mia	24	m	8
m	120			m	8	mia	4			mia	8
m	148	Pre-2		m	12	m	28			mia	56
		m	8	mia	8	m	4	sham 1		mia	28
Post-2		mia	16	m	108	mia	56	Rep. 1		m	40
m	120	mia	36	m	8	mia	24	Pre-1		mea	4
m	16	mia	44	m	32	mia	20	m	108	m	216
m	8	mia	24	mia	4	mia	28	m	28	m	24
m	52	mia	8	mia	16	mia	24	m	44	Post-1	
m	60	mia	28	mia	32	mia	16	mia	84	m	20
m	12	mia	52	m	56	mia	28	mia	36	m	20
m	132	mia	72	mia	4	mea	24	mia	92	m	16
m	24	mia	36	mia	68	m	264	mea	48	m	44
m	272	mia	44	mia	44	m	4	mia	456	m	40
m	232	mia	84	mia	40	m	56	mia	36	m	40
m	216	m	32	m	40	m	4	mia	84	m	24
		mia	68	mia	68	m	92	mia	152	m	4
Post-3		mea	64	mia	36	mia	4	mia	76	mia	8
m	120	m	468	mea	56	mia	24	mea	20	mia	28
m	252	mia	8	m	188					mia	36
m	264	mia	44	m	140	Post-3		Pre-2		m	16
m	16			m	4	mia	4	m	68	mia	20
m	4	Pre-3		m	4	mia	28	m	184	m	16
m	4	m	4	m	32	mia	44	m	700	mia	16
m	64	mia	8	mia	4	mia	48	m	144	m	32

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
m	8	mia	8	m	16	mia	28	Post-2		mia	20
m	4	m	16	m	20	mia	24	m	20	mia	32
mia	20	mia	8	m	12	mia	32	m	8	mia	36
mia	48	mia	24	m	16	mia	12	mia	4	mia	40
m	16	m	12	m	20	mia	20	mia	20	m	36
m	12	mia	12	m	28	mia	28	mia	20	m	4
mia	20	m	12	m	20	mia	12	mia	28	mea	4
m	12	mia	20	mia	20	mia	32	m	20	mia	528
mia	40	mia	20	m	16	mia	12	mia	8	m	12
mea	20	m	12	m	8	mia	20	m	16	m	12
m	240	m	20	m	16	m	20	m	12	m	8
m	168	m	20	m	16	mia	24	mia	4	m	20
mia	4	mia	20	m	32	mia	48	mia	16	mia	16
m	20	m	36	mia	12	mia	16	m	28	m	24
mia	36	m	12	m	4	mea	44	mia	16	mia	24
mia	24	m	24	mea	4	m	180	m	16	m	20
m	32	m	16	m	56	m	12	mia	12	mea	4
m	28	m	20			mia	92	m	12		
mia	20	mia	28			m	28	m	40		
m	28	m	16	sham	3	mia	32	m	20	sham	10
m	4	mia	24	Rep.	1	mia	16	m	4	Rep.	1
m	4	m	20	Pre-1		mia	24	mia	8	Pre-1	
m	24	m	28	m	56	mia	16	m	16	m	200
m	28	m	12	m	72	m	24	m	116	mia	40
m	28	m	24	mia	52	mea	4	m	20	m	16
m	12	mia	8	mia	88	m	148	m	208	m	48
m	56	m	16	mia	44	m	12	m	108	m	16
m	68	m	8	mea	76	m	88	m	52	m	28
m	96	mia	16	mia	432	m	96	mia	24	m	28
m	28	m	20	mia	68			mia	20	m	24
m	64	mia	20	mia	92	Post-1		mia	12	mia	80
m	124	m	20	mia	52	mia	24	m	12	m	12
m	28	mia	28	mea	76	mia	8	mia	20	mia	44
m	48	m	28			mia	28	m	20	mia	28
m	12	mia	12	Pre-2		mia	56	m	8	m	28
m	212	m	20	m	56	m	40	m	16	m	20
m	20	m	20	m	28	m	16	mia	28	m	108
m	84	mia	12	m	12	mia	44	m	24	mea	32
m	44	m	16	m	288	m	304	mea	8	m	228
m	36	m	20	m	536	mia	184				
m	44	m	20			mia	44	Post-3		Pre-2	
m	120	m	4	Pre-3		mia	32	m	4	m	12
		m	24	m	4	m	52	mia	8	m	80
Post-3		m	24	m	4	m	8	mia	12	m	92
mia	4	m	8	mia	12	mea	16	mia	20	m	40
m	8	m	20	mia	28			m	16	m	124

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
m	460	m	132	mia	28	mia	24	m	12	mia	28
m	4	m	4	m	72	m	24	mia	8	mia	48
m	36	m	132	mia	4	mia	20	m	16	mia	24
mia	4	m	44	m	12	mia	16	m	12	m	20
mia	68	m	24	m	16	m	24	m	4	mia	8
mia	36	mia	16	mea	8	mea	12	mia	8	m	12
mia	16	m	16	m	240	m	344	m	24	mia	28
m	36	m	36	m	32	mia	12	mia	4	mia	16
mia	28	mia	4	m	20	mia	12	m	20	mia	16
mia	28	m	20	m	64			mia	24	mia	32
mia	32	m	32	m	20	Post-3		m	16	mia	36
mia	36	m	20	mia	72	mia	4	mia	4	mia	24
mia	64	mia	4	m	8	m	8	m	32	mea	52
		mia	48	mia	12	m	8	mea	4	m	372
Pre-3		m	20	mia	4	m	12			mia	8
m	8	m	12	m	24	mia	12			mia	52
m	8	m	44	m	56	mia	8	sham	22	mia	16
m	4	m	8	mia	4	mia	12	Rep.	1	mia	24
mia	12	mia	4	m	52	m	24	Pre-1		mia	16
m	12	m	20	mia	8	m	4	m	36	mia	40
m	12	m	24	m	8	mia	4	m	24	mia	20
m	4	mia	32	mia	4	m	20	m	64	mia	8
mia	12	m	20	m	96	m	4	m	4	mia	60
mia	12	mia	8			m	24	mia	60	mea	32
m	20	mia	16	Post-2		m	4	mia	28		
m	20	m	16	m	4	m	12	mia	20	Pre-3	
mia	28	m	24	mia	12	m	4	mia	88	m	4
mia	16			mia	8	mia	12	mia	28	m	4
m	16	Post-1		mia	12	m	12	mia	20	mia	12
m	8	m	12	mia	16	m	12	mia	84	m	8
m	12	m	24	mia	20	m	4	mia	4	mia	4
m	8	mia	12	mia	60	m	12	mia	4	m	20
mia	4	mia	8	mia	16	m	4	m	72	mia	16
m	28	mia	12	mia	16	m	4	mea	20	m	24
mia	4	m	20	m	20	mia	8	mia	448	m	20
m	20	mia	20	mia	20	m	16	mia	52	mia	16
mia	4	m	20	mia	20	mia	16	mia	100	mia	20
mia	20	mia	36	mia	16	m	28			mia	24
m	20	m	8	mia	20	mea	4	Pre-2		mia	24
m	8	mia	8	m	24	m	256	m	8	mia	16
mia	28	m	20	mia	20	m	28	m	8	m	20
m	44	m	28	mia	32	m	116	m	4	m	16
m	12	m	16	m	20	m	4	mia	4	mea	4
mia	12	m	32	mea	52	m	4	mia	16	m	252
mia	4	m	16	mia	308	mia	16	m	28	mia	4
mea	28	mia	4	mia	12	m	12	mia	40	mia	28

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
m	24	m	16	mia	36	m	8	m	28	nor 8	
mia	12	m	4	m	12	m	32			Rep. 1	
m	20	mea	4	mea	24	m	4	Post-1		Pre-1	
m	28	m	192	m	236	m	4	m	8	m	16
m	4	m	76	m	4	m	16	m	24	m	8
mea	4			m	12	m	32	m	172	m	12
mia	396	Post-2		m	76	m	4			mia	8
mia	20	m	12	m	80	m	12	Post-2		mia	28
mia	16	m	28	m	4	m	40	m	56	m	20
m	28	m	12	mia	4	m	40	m	32	mia	32
mia	4	m	4	mia	36	m	32	m	68	mia	160
m	20	m	8	m	20	m	8	m	76	mia	16
mia	8	m	16	mia	24	m	28	m	48	mia	32
m	24	m	16	m	28	m	100	m	20	mia	316
m	4	mia	8	mia	20	m	228	m	28	mia	24
mia	4	m	20	mia	28	m	16	m	4	m	28
m	24	mia	4	m	24	m	36	m	52	mia	68
		m	28	m	4	mia	4	m	24	mea	92
Post-1		mia	4	mea	4	m	8	m	160	mia	104
m	4	mia	32	m	212	m	144	m	404	mia	160
mia	4	m	16	m	92	m	320				
mia	12	m	4					Post-3		Pre-2	
mia	12	mia	8			Pre-3		m	4	m	4
mia	20	mia	36	nor 4		m	4	m	4	m	12
mia	16	m	20	Rep.1		m	4	m	8	m	40
mea	24	m	4	Pre-1		m	4	m	20	m	8
m	216	mia	4	m	148	m	4	m	44	m	8
mia	52	m	296	mia	8	m	4	m	52	m	32
mia	12	m	24	mia	112	m	24	m	16	m	24
m	16	m	48	mia	72	m	8	m	12	m	44
mia	16	mia	4	mia	56	m	4	m	28	m	12
mia	16	mia	44	mia	32	m	28	m	56	m	12
mia	16	m	16	mia	40	m	152	m	16	m	4
m	20	mia	16	mia	28	m	116	mia	4	m	24
mea	4	mia	28	mia	72	m	48	m	20	m	4
m	216	mia	20	mia	56	m	344	m	4	m	104
m	36	m	28	mia	24	m	4	m	40	m	76
m	4	mea	8	mia	20	m	20	m	4	m	144
m	40			mia	28	m	4	m	84	m	16
m	24	Post-3		mia	100	m	28	m	16	m	32
m	4	mia	8	mia	48	m	20	m	108	m	8
mia	12	mia	20	mia	32	m	36	m	48	m	72
m	12	mia	16	mea	36	m	88	m	288	m	84
mia	20	m	20			m	24	m	4	m	12
m	16	mia	4	Pre-2		m	44	m	112	m	44
mia	16	mia	24	m	16	m	96			m	100

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
m	32	m	16	m	12	m	20	Pre-2		mia	32
m	56	m	28	mia	12	m	12	m	24	mia	32
mia	4	m	36	m	16	mia	12	m	12	mia	104
mia	44	m	8	m	16	mia	12	mia	4	m	40
Pre-3		m	4	mia	8	m	24	m	4	m	8
m	4	m	12	mia	12	mia	24	m	16	m	72
m	4	m	4	mia	32	mia	12	mia	16	m	4
mia	4	m	16	mia	24	m	32	mia	88	mea	4
m	80	m	28	m	32	m	8	m	4		
mia	52	m	4	m	28	m	4	mia	4	Post-1	
mia	72	m	36	m	36	mia	8	mia	32	m	84
mia	80	m	48	mia	12	m	36	mia	88	m	20
mia	40	m	8	m	56	mea	4	mia	140	m	56
m	48	m	4	mia	4	m	324	mia	112	m	4
mia	28	m	4	mia	16	m	44	mia	68	m	72
mia	32	m	16	mia	48	m	76	mia	52	m	4
mia	48	m	4	m	40	m	4	mia	132	m	84
mia	44	m	4	mia	8	m	4	m	8	m	32
m	20	m	4	m	60	m	44	mia	4	m	4
mia	12	m	12	mia	4	m	4	mia	172	m	4
mia	56	mia	4	mia	16	mia	4			m	108
m	28	m	28	m	88	mia	28	Pre-3		m	204
mia	12	mia	8	mia	4	mia	48	m	16	m	156
mia	44	m	24	m	56	mia	28	m	32	m	24
mia	68	mia	4	mia	4	mia	60	m	24	m	168
mia	12	m	36	mea	12	m	36	m	20	m	4
m	16	mia	16	m	172	m	20	m	76		
mia	48	m	24	m	72	mia	4	mia	4	Post-2	
m	28	mia	8	m	236			mia	4	m	20
mia	8	mia	20	m	4			m	8	m	32
mia	48	mia	36	mia	4	nor 11		m	16	m	4
m	44	m	36	m	32	Rep. 1		mia	4	mia	4
mea	60	mia	4	mia	12	Pre-1		mia	36	mia	16
		m	16			m	96	m	24	m	8
Post-1		m	24	Post-3		m	56	m	8	mia	4
m	4	m	8	m	4	mia	16	mia	4	m	20
m	4	mia	4	m	4	mia	8	m	56	m	4
m	4	m	56	m	20	m	64	mia	40	mia	36
m	12	mia	8	mia	8	m	76	mia	72	mia	12
m	28	mia	12	m	40	m	52	mia	20	mia	20
m	40	m	36	m	60	mia	64	mia	60	mia	32
m	8	mea	4	mia	4	mia	96	mia	36	mia	24
m	24	m	128	mia	28	mia	16	mia	32	mia	40
m	20			mia	20	mea	16	mia	20	mia	24
m	48	Post-2		m	48	mia	300	mia	48	mia	28
m	24	mia	4	mia	20	mia	132	m	20	mia	40

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	16	m	20	mia	36	m	36	m	8	mia	4
m	32	mia	4	mia	28	m	40	m	8	m	24
mia	36	m	20	m	56	mia	24	mia	8	m	12
mea	32	mia	4	mia	4	mia	48	m	8		
m	320	mia	36	mia	40	mia	24	m	8	Post-3	
mia	8	m	20	m	60	m	28	m	12	m	4
m	24	m	4	m	12	mia	8	m	8	m	4
mia	12	m	4	m	12	m	24	m	12	m	4
mia	32	m	4	mea	12	m	20	mia	16	m	4
mia	44	m	4	m	440	mia	40	mia	40	mia	4
mia	36	mea	4	mia	4	m	48	mia	24	m	28
mia	40			mia	52	m	4	mia	32	mia	20
m	28			mia	44	m	4	mia	20	mia	32
m	4	nor 13		mia	48	mea	4	mia	24	m	36
mea	4	Rep. 1		m	60			mia	36	mia	48
		Pre-1		m	4	Post-1		m	20	m	4
Post-3		m	20	m	8	mia	16	mia	12	mia	4
m	4	m	36	mia	20	mia	16	m	24	mia	52
m	4	m	24	mia	20	mia	24	m	4	m	28
mia	4	m	8			m	36	m	32	mia	8
m	16	m	40	Pre-3		mia	4	m	20	m	24
mia	20	m	80	m	4	m	12	m	16	m	20
mia	12	m	104	m	12	m	4	m	12	m	48
mia	20	mia	4	mia	4	m	32	m	4	m	4
mia	28	mia	88	m	24	mia	4	m	4	mia	36
mia	28	mia	4	mia	4	mia	12	m	4	m	32
mia	20	mia	28	m	24	m	20	m	4	m	16
m	20	mia	40	mia	32	m	12	mea	4	mia	40
m	20	mia	72	mia	44	mia	16	m	384	m	28
mia	4	mia	12	m	24	m	20	m	28	m	4
mia	20	mia	68	mia	24	mia	8	mia	4	m	4
mia	24	mia	72	m	24	m	44	m	40	m	28
m	28	mia	56	m	24	mia	8	m	20	m	36
mia	36	m	92	m	4	m	28	mia	4	mia	4
m	12	mia	4	mia	16	mea	4	mia	28	mea	40
mia	4	mia	48	m	68	m	396	mia	36	m	396
m	28	mea	40	m	8	mia	4	m	56	m	4
mia	16			m	20	m	12	mia	4	m	16
m	320	Pre-2		m	4	mia	4	m	24	m	4
m	12	m	36	m	8	mia	20	m	4	m	24
m	36	m	32	m	4	m	16	m	4	mia	20
mia	4	mia	4	mea	8	mia	24	m	4	mia	36
m	16	m	28	m	356	mia	36	m	4	m	40
m	8	mia	40	m	52	mea	24	m	4		
mia	4	m	36	mia	4			m	4		
mia	36	mia	20	mia	36	Post-2		m	4	nor 15	

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
Rep. 1		m	16	m	20	mia	4	m	28	mia	20
Pre-1		mia	4	mia	8	mia	16	mia	8	mia	48
m	432	m	28	mia	28			mia	8	mia	76
mia	76	m	12	mia	12	Post-3		mia	8	mia	28
mia	64	mia	8	mia	52	m	12	mia	16	mia	20
mia	132	mia	24	m	12	m	4	mia	24	mia	24
mia	48	m	24	m	4	mia	4	mia	24	mia	4
mia	76	mia	24	mia	4	m	16	m	12	mia	36
mea	160	mia	16	m	20	m	4	mia	28	mia	48
mia	196	mia	56	mia	8	mia	8	mia	44	mia	56
		mia	28	m	16	mia	8	mia	28	mea	24
Pre-2		mea	44	mea	4	m	20	mia	88	m	236
m	16	mia	492			mia	8	mia	16	m	8
m	4	m	4	Post-2		mia	8	mia	4	m	48
m	4	mia	4	m	28	mia	28	mia	4	m	48
m	20	mia	40	m	4	m	32	mia	28	mia	12
m	8	mia	52	m	48	mia	8	mia	36	mia	12
m	20	m	12	m	4	mia	44	mia	20	mia	36
m	48	mia	68	m	4	mia	16	mia	8	mia	24
mia	4	mia	20	m	4	mia	24	mea	20	mia	8
m	16	mia	28	m	4	mea	32	m	280	mia	28
m	32	mia	32	mia	4	m	412	m	4	mia	12
m	68	mea	40	m	40	m	64	mia	28	mia	12
mia	36			m	4	m	4	mia	28	m	24
m	32	Post-1		m	80	mia	4	mia	12		
m	4	m	8	m	16	mia	20	mia	8	Pre-3	
mia	4	mia	4	m	160	mia	36	mia	32	m	4
m	8	m	52	m	52	mia	24	mia	16	m	4
mia	4	m	16	m	4	mia	24	m	16	m	4
m	44	mia	4	mia	4	mia	20	mia	4	m	4
m	228	mia	24	mia	16	m	28			m	12
mia	4	m	32	m	24	m	16	Pre-2		mia	8
m	104	mia	4	mia	4	mia	36	m	24	mia	12
m	16	mia	12	mia	20	mia	16	m	8	m	28
mia	4	mia	20	mia	16	mia	40	m	4	m	24
m	164	mia	28	m	16	m	48	m	4	m	4
m	120	mia	32	mia	4	mea	20	m	16	mia	8
		mia	52	mia	20			m	4	mia	56
Pre-3		m	20	m	16			m	20	mia	28
m	8	mia	12	m	12	nor 17		m	20	mia	56
mia	4	mia	52	mia	16	Rep. 1		m	8	m	60
m	12	mia	16	mia	36	Pre-1		mia	12	mia	4
m	24	mia	16	m	16	mia	232	mia	68	mia	8
mia	8	mea	16	mea	4	m	28	m	72	mia	12
m	24	mia	496	m	488	m	44	mia	4	mia	20
mia	12	mia	8	m	4	m	20	m	32	mia	4

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mea	4	m	44	mia	4	mia	56	mia	32	m	8
mia	508	mia	24	m	24	mia	44	mia	20	mia	8
mia	16	mia	16	m	12	mia	112	mia	20	m	36
m	44	mea	24	mia	16	mia	40	m	16	mea	4
mia	8			m	68	mia	44	mia	12	m	352
mia	44	Post-2		mia	4	mia	88	m	12	mia	4
mia	12	m	4	mia	16	mea	80	m	24	mia	20
m	12	m	4	m	48	m	272	mia	12	m	20
mia	36	m	8	mia	4	m	4	mia	12	m	8
mia	20	m	8	mia	36	m	28	mia	12	m	16
mia	16	m	24	mia	20	mia	60	m	36	mia	12
m	20	m	8	m	20	mia	8	m	4	mia	20
mia	44	m	4	mea	4	mia	24	mea	4	m	20
mia	4	m	4			m	20	m	412	m	12
m	16	m	4	Post-3		m	12	mia	4	m	16
mia	4	m	16	m	8	mia	4	mia	16	m	4
		m	4	mia	4			m	16	m	4
Post-1		m	4	m	12	Pre-2		mia	8	m	48
m	4	m	20	mia	12	mia	4	mia	44	m	8
mia	4	m	8	mia	20	mia	12	m	12	mea	8
mia	8	m	16	m	68	mia	12	m	12	m	320
m	12	m	20	mia	28	m	16	m	16		
m	12	m	36	mia	20	m	12	mia	8	Post-2	
m	4	m	8	mia	24	mia	12	mia	36	m	28
m	44	m	16	mia	24	m	12	m	24	m	60
mia	4	m	4	mea	24	mia	12	mia	8	m	52
m	8	m	12	m	120	mia	20	m	24	m	200
mia	32	m	116	m	60	mia	24	mia	16	m	44
m	24	m	36	m	96	mia	48	m	16	m	268
mia	4	m	20	m	120	mea	32	m	8	m	132
mia	24	m	24	m	24	m	272	mea	8	m	4
mia	44	m	4	mia	48	mia	4				
mia	40	m	20	mia	44	m	16	Post-1		Post-3	
mia	40	m	44	mia	44	mia	16	mia	8	mia	4
m	16	m	4	mia	28	mia	20	m	20	m	8
m	60	m	20	mea	32	mia	60	mia	24	mia	8
mia	12	m	16	m	256	mia	16	m	16	mia	16
mia	20	m	28			m	24	mia	16	m	36
mia	24	m	52			mea	44	m	28	mia	36
mea	20	m	24	cing	24			m	12	mia	40
m	452	m	44	Rep.	2	Pre-3		mia	4	mia	84
mia	8	m	4	Pre-1		mia	8	m	20	mea	64
mia	20	m	60	m	8	mia	28	mia	8	m	280
mia	16	m	36	m	4	m	24	mia	28	mia	8
mia	24	m	8	mia	24	mia	4	m	16	mia	16
mia	24	m	4	mia	64	mia	20	m	4	mia	28

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	20	mia	28	m	8	mia	8	m	44	mia	20
mia	16	mia	16	mia	8	mia	4			m	24
m	24	mia	24	mia	16	m	12			m	24
mea	8	mia	24	mia	24	m	4	cing 29		mia	16
m	276	m	20	mia	20	m	4	Rep. 2		mea	24
m	128	mea	20	mia	20	m	8	Pre-1		m	180
m	20	mia	356	m	20	mia	12	m	16	m	384
m	4	mia	8	m	8	m	16	mia	20	mia	4
mia	24	m	16	mia	16	mia	16	mia	12	mia	20
mia	12	m	16	m	20	mia	20	mia	24	mia	24
mia	24	mia	16	m	16	mia	16	m	16	m	24
		m	20	m	8	mia	16	mia	12	mia	20
		mia	8	mia	12	mia	12	mia	20	mia	20
cing 28		m	16	mia	24	mia	8	mia	16	m	28
Rep. 2		mea	4	mia	20	mia	16	mia	20	mia	20
Pre-1		m	116	m	16	mia	16	mia	16	m	64
m	40	m	12	mia	16	m	12	mia	20	mia	16
mia	4	mia	16	mia	24	mia	4	m	16		
m	28	mia	16	mia	24	mea	16	mea	20	Pre-3	
m	28	mia	8	m	24	m	124	mia	456	m	16
mia	12	mia	20	m	4	m	136	mia	20	mia	4
mia	36	m	28	m	4			mia	16	mia	4
m	24	mea	8	mea	4	Post-3		mia	24	mia	20
mia	4			mia	356	m	4	mia	16	mia	24
mia	36	Pre-3		m	16	m	8	m	16	mia	24
mia	28	m	32	mia	12	mia	4	mia	20	m	24
m	36	m	132	mia	12	mia	20	m	28	mia	40
mia	4	m	76	m	12	mia	12	mia	20	mia	16
m	32	m	20	m	12	m	16	mea	20	m	20
mea	32	m	88	m	4	mia	8	m	312	mia	4
m	316	m	352	m	4	m	12			m	48
mia	36	m	312	mea	20	mia	12	Pre-2		mia	4
mia	16	m	200			m	12	m	8	mia	16
m	16	m	4	Post-2		mea	4	mia	4	mia	36
mia	8	m	12	m	4	m	240	mia	16	mia	12
mea	20			m	16	m	100	mia	16	mea	16
m	372	Post-1		m	12	m	60	mia	36	m	580
mia	56	m	8	m	36	mia	4	mia	20	mia	4
		mia	8	m	104	m	20	mia	16	mia	20
Pre-2		mia	12	m	36	mia	8	mia	16	m	20
m	8	mia	12	m	32	mia	44	mia	20	mia	4
mia	4	m	8	m	84	m	24	mia	40	mia	16
m	8	mia	4	m	64	mea	8	mia	16	mia	20
mia	16	mia	16	m	72	m	320	mia	28	mia	16
mia	16	mia	12	m	44	m	84	mia	20	mia	24
mia	12	m	16	m	96	m	112	mia	24	mia	16

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	12	m	56	mia	48	mia	8	mia	64	m	4
mia	28	m	16	mia	168	mia	60	m	40	mia	4
m	20	m	52	mia	148	mia	44	mia	40	mia	84
mia	8	m	232	mia	188	mia	44	mia	20	m	8
mea	20	m	12	mia	216	mia	96	mia	32	mia	56
		m	472	mia	64	mea	24	mia	64	m	8
Post-1		m	104	mia	144	mia	448	mia	24	mia	4
m	4	m	80	m	48	m	16	mia	32	mia	28
mia	20			mea	4			mea	32	mia	28
mia	16	Post-3				Post-1		m	372		
mia	20	m	4	Pre-2		m	8	mia	8	Pre-2	
m	16	mia	4	m	4	m	4	mia	4	m	4
mia	4	mia	28	m	4	mia	32	mia	68	mia	4
mia	16	mia	48	mia	8	mia	60	mia	100	mia	20
m	36	mia	20	m	48	mia	60			mia	12
mia	12	m	40	m	16	mia	40			m	36
mia	16	mia	4	m	60	mia	60	cing	39	mia	20
mia	28	mia	44	mia	12	mia	68	Rep.	2	mia	20
m	28	mia	36	mia	72	mia	64	Pre-1		mia	24
mia	36	mia	28	mia	208	m	28	mia	44	mia	28
mia	24	m	48	mia	60	m	8	m	16	mia	60
mia	16	m	60	mia	112	mia	4	mia	32	mia	36
mia	36	mea	4	mia	40	mia	44	mia	20	mia	32
m	16	m	188	mia	32	mia	48	mia	20	mia	36
mia	28	m	40	mia	120	m	44	m	24	m	20
mia	20	m	16	mia	16	mia	24	mia	4	mia	24
mia	28	m	44	mia	60	mea	68	mia	20	mia	36
mia	24	m	36	mia	96	m	376	m	60	mia	24
mia	48	m	112	mia	40	mia	20	mia	4	mia	28
m	12	m	12	mia	48	mia	32	mia	48	m	20
mia	40	m	20	mia	24	mia	84	m	12	mia	36
mia	16	mia	28	mia	92			mia	4	mia	20
mia	28	mia	84	m	24	Post-2		mia	28	mea	40
m	16	mia	48			m	8	mia	16	m	408
mia	16	mia	44	Pre-3		m	20	mia	36	mia	12
mia	16	m	72	mia	4			m	24	mia	24
mea	12	mia	12	mia	128	Post-3		m	4	mia	32
m	284	mea	40	m	32	m	4	mia	68	mia	20
m	160			m	44	mia	4	m	12	mia	20
mia	4			mia	8	m	36	mia	4	mia	48
mia	28	cing	34	mia	60	mia	16	mia	32	mea	20
mia	16	Rep.	2	m	4	mia	40	mi	12		
mia	16	Pre-1		mia	56	mia	52	mea	4	Pre-3	
		m	8	m	24	mia	12	m	372	m	4
Post-2		m	4	m	72	mia	36	m	4	m	4
m	4	m	4	m	20	mia	32	m	32	mia	12

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
m	12	mia	32	mia	20	m	4	mia	1068	Pre-2	
mia	20	mea	28	m	24	mia	16			m	8
mia	16	mia	232	mia	24	m	12	Post-2		m	4
mia	12	mi	4	mia	40	mia	12	m	20	mia	12
mia	24			m	28	mia	24	m	24	mia	12
mia	20	Post-2		mea	28	mia	24	m	120	m	16
mia	20	mia	12	m	464	mia	20	m	256	mia	16
mia	32	mia	8	m	36	mia	28			mia	36
mia	20	mia	16	mia	4	mia	24	Post-3		mia	28
m	36	m	12	mia	20	mia	24	m	692	m	20
m	4	mia	16	mia	20	m	16	m	360	m	4
mia	4	m	24	mia	24	mia	24			mia	4
m	28	mia	16	mia	24	mia	16			m	40
mea	4	mia	24	mia	36	m	16	neo 31		mia	4
m	412	mia	16	mia	24	mia	20	Rep. 2		m	24
mia	4	mia	52	mea	48	mia	24	Pre-1		m	24
mia	48	mia	32			m	24	m	12	mia	4
m	32	mia	16			mia	28	m	8	mia	24
mia	24	mia	20	neo 27		mia	32	mia	12	m	40
mia	56	mia	36	Rep. 2		m	24	mia	16	mia	36
m	28	mia	20	Pre-1		mea	4	mia	24	mia	20
mia	4	mia	28	m	36	mia	436	mia	32	m	28
mea	44	mea	44	mia	4	m	28	mia	44	m	8
		m	164	mia	60	mia	12	mia	24	mia	4
Post-1		m	52	m	20	mia	40	mia	32	m	16
m	8	m	48	m	52	m	24	mia	24	mea	4
mia	12	m	88	mia	4	m	12	mia	24	m	416
mia	24	m	20	m	28	mia	52	mia	24	m	4
mia	16	mia	48	mia	36	mia	40	mia	32	m	12
mia	20	mia	24	mia	48	m	24	mea	40	m	28
mia	32	mia	20	m	36	mea	24	m	308	mia	44
mia	28	mia	20	mia	16			m	4	mia	32
mia	20	mia	20	mia	76	Pre-3		m	4	mia	32
mia	16	mia	32	mia	20	m	24	mia	24	m	100
mia	32	m	24	m	52	m	12	mia	44	mia	40
m	20	mia	16	mia	4	m	20	mia	12		
mia	24	mia	28	mia	56	m	4	mia	32	Pre-3	
mia	32	mia	24	m	20	m	32	mia	32	mia	24
m	32	mea	44	m	8	m	16	mia	28	mia	16
mea	48			mia	4	m	440	mia	40	mia	20
m	276	Post-3		mia	36	m	80	mia	32	m	48
mia	56	m	4	m	64	m	488	mia	28	m	4
mia	16	mia	16	mia	4			mia	108	m	4
mia	32	mia	16	mea	36	Post-1		mia	48	mia	8
mia	24	mia	20			m	40	mia	8	m	28
m	36	mia	20	Pre-2		m	4	mea	4	mia	4

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	36	m	368	m	20	mia	16	Post-1		Post-3	
m	184	m	4	mia	12	mia	24	mia	8	m	4
mia	4	mia	12	m	28	mia	28	mia	132	m	4
m	64	mia	8	mia	28	mia	32	m	24	m	4
mia	4	mia	20	m	24	m	40	m	40	m	72
mia	32	mia	20	m	16	mia	20	mia	4	mia	28
m	100	mia	20	m	8	mia	72	m	64	m	48
m	4	mia	20			m	12	mia	4	mia	72
mia	8	mia	24			mia	36	mia	112	mia	16
mea	16	mea	16	neo 36		mia	16	m	68	mia	40
m	356	m	400	Rep. 2		m	16	mia	56	m	72
m	84	m	32	Pre-1		mia	28	mia	64	mia	36
m	24			m	164	m	16	mia	112	mia	48
m	72	Post-3		mia	60	mia	40	mia	56	mia	28
mia	4	mia	4	mia	76	mia	20	mia	88	m	40
mia	32	mia	12	mia	100	m	20	mia	52	m	36
m	20	mia	24	mia	60	mia	36	mia	64	m	24
m	20	mia	20	mia	24	mea	20	m	72	mia	4
		mia	16	m	92			mia	92	mia	36
Post-1		m	28	mia	24	Pre-3				mia	52
m	136	mia	20	mia	52	m	8	Post-2		mia	32
m	4	mia	40	mia	20	m	8	m	12	mia	32
m	40	mia	16	mia	76	mia	20	mia	4	m	28
m	120	m	20	m	16	mia	28	m	8	m	44
m	656	mia	24	m	16	mia	40	mia	4	mia	24
m	112	mia	20	mia	4	mia	32	mia	36	mia	44
		mia	24	m	56	mia	32	m	48	m	56
Post-2		mia	20	m	4	mia	28	m	24	mia	12
m	12	m	36	mea	4	mia	56	mia	4	mia	68
m	4	mea	4			mia	20	mia	88	mia	36
m	4	m	324	Pre-2		mia	48	mia	52	mia	52
mia	4	m	16	mia	8	m	28	mia	36	mia	32
m	8	m	116	m	16	mia	44	mia	52	mia	32
mia	8	mia	4	mia	20	mea	20	m	48	m	16
mia	8	mia	20	mia	32	m	372	mia	48	mea	8
m	32	mia	36	mia	36	m	4	mia	56		
mia	4	mia	28	mia	16	mia	72	mia	44		
mia	12	mia	20	mia	76	m	8	mia	60	neo 40	
mia	16	mia	24	mia	20	m	28	m	28	Rep. 2	
m	20	mia	20	mia	36	mia	36	m	48	Pre-1	
mia	4	mia	20	m	32	mia	28	m	40	mia	168
mia	16	mia	16	mia	8	mia	28	mia	28	m	28
m	32	mia	20	mia	40	m	28	m	56	mia	20
m	16	m	36	mia	24	mia	44	mea	28	mia	16
m	12	mia	4	mia	24	mia	56	m	240	mia	20
mea	8	mia	24	m	32	m	32			m	20

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	40	m	56	mia	20	m	36	mia	40	mia	32
m	16	mia	4	mea	20	m	40	mia	8	mia	24
mia	8	mia	28	m	252	m	24	m	36	mia	28
m	36	mia	60	m	24	m	16	mia	8	m	40
m	16	mia	20	m	64	m	4	mia	20	m	16
mia	20	mia	28	m	24	m	80	mia	72	mia	28
mea	24	mia	24	mia	20			m	52	mia	20
m	316	mia	24	mi	12	Post-3		mea	24	m	24
mia	36	mia	24	m	4	m	4	mia	440	mia	16
m	28	mia	44	mia	16	mia	4	mia	36	mia	84
mia	28	m	48	mia	16	mia	12	m	84	mia	20
mia	56	m	20	mia	20	m	16	mia	4	m	24
m	24	mia	16	mia	16	mia	4	m	68	m	20
mea	8	mea	36	mea	16	m	20	m	24	mia	4
		m	420			m	12	mia	16	mia	20
Pre-2		mia	24	Post-2		mia	20	mia	28	m	24
m	8	mia	24	m	12	mia	16			mia	4
mia	4	mia	36	m	32	m	20	Pre-2		mia	24
mia	120	mia	28	m	16	mia	4	m	12	mea	20
mia	132	mia	36	m	8	m	20	mia	12		
mia	212	mea	28	m	32	mia	20	m	108	Post-1	
mia	32			m	64	mea	12	mia	104	mia	12
mia	12	Post-1		m	12	mia	360	mea	60	m	32
mia	20	m	4	m	4	mia	24	mia	400	mia	24
mia	24	mia	4	m	4	mia	16	mia	144	mia	20
mea	28	mia	12	m	4	m	16	mia	112	mia	24
m	416	mia	20	m	24	mia	12	m	164	mia	32
mia	4	m	16	m	28	m	24	mea	4	m	36
mia	12	mia	16	m	12	mia	4			mia	28
mia	24	mia	24	m	36	m	16	Pre-3		mia	24
mia	20	m	24	m	24	mia	24	m	12	mia	32
mia	24	mia	24	m	24	mia	16	mia	4	mia	56
mia	52	mia	24	m	76	mea	16	mia	32	mia	20
mea	24	mia	20	m	4	m	412	mia	52	m	20
		mia	24	m	24	m	4	mia	24	m	48
Pre-3		mia	24	m	20			mia	48	mia	32
m	8	m	16	m	24			mia	24	mia	20
m	4	mea	12	m	52	neo 41		mia	20	mia	32
m	12	m	184	m	88	Rep. 2		mia	76	m	12
m	36	m	100	m	4	Pre-1		mia	20	mia	20
m	4	mia	16	m	64	m	24	mia	32	mia	32
m	32	mia	28	m	24	m	8	mia	24	m	40
mia	24	mia	24	m	4	mia	28	mia	28	m	20
m	4	mia	20	m	80	mia	52	mia	24	mea	4
m	44	mia	16	m	8	mia	24	mia	44	m	348
m	4	mia	20	m	128	m	72	mia	16	mia	12

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
m	64	mia	28	mia	36	mia	40	Post-3		mia	8
mia	12	m	32	mea	40	mia	20	m	4	mia	20
mia	28	mia	16	m	220	mia	40	m	12	mia	32
m	28			m	72	m	16	m	12	mia	20
mia	52			mia	32	mia	24	m	16	mia	20
mea	36	sham 23		mia	24	m	44	m	8	mia	24
		Rep. 2		mia	56	m	24	m	8	mia	24
Post-2		Pre-1		mia	32	mia	24	m	4	mia	16
m	16	m	20	m	28	m	16	m	32	mia	52
m	8	mia	28	m	24	mia	4	m	60	mia	16
m	24	m	36	mia	12	m	36	m	48	mia	20
m	12	mia	12	mia	20	mia	16	m	16	mea	20
m	24	mia	44	m	48	mia	48	m	48		
m	4	mia	32	m	4	mia	64	m	4	Pre-2	
m	24	mia	40	m	8	m	32	m	144	mia	12
m	80	mia	32	m	4	m	12	m	72	m	12
m	44	mia	40	mia	8	m	28	m	4	mia	8
m	108	mia	36	m	16	mea	4	m	12	mia	20
m	108	mia	36	mea	16			m	200	mia	12
m	64	mia	32			Post-1		m	32	mia	20
m	56	mea	48	Pre-3		m	32	m	64	m	20
m	500	m	292	m	4	m	4	m	28	mia	20
m	24	m	32	mia	20	m	20	m	52	mia	36
m	4	mia	28	m	12	m	4	m	112	mia	24
		mia	52	m	4	m	40	m	36	m	20
Post-3		mia	52	m	16	m	44			mia	20
mia	4	mia	60	m	8	m	312			mia	24
mia	12	m	40	m	8	m	16	sham 25		mia	20
m	12	mea	28	m	8	m	552	Rep. 2		mia	16
mia	16			m	8	m	4	Pre-1		mia	32
mia	20	Pre-2		m	12	m	4	m	96	m	28
mia	20	m	4	mia	4	m	144	mia	24	mia	20
m	24	mia	8	m	12			mia	28	mia	28
mia	4	mia	12	mia	20	Post-2		mia	4	mia	20
mia	16	mia	16	mia	24	m	8	mia	32	mia	32
mia	24	m	20	mia	24	m	16	mia	16	mia	12
mia	28	mia	16	m	20	m	4	mia	24	mia	24
m	20	m	44	mia	24	m	4	mia	24	m	48
mea	44	mia	20	m	8	m	32	m	24	mia	12
m	392	mia	40	m	4	m	44	mia	24	mia	20
mia	4	mia	44	m	16	m	32	mia	24	mea	12
mia	12	mia	28	mia	20	m	228	mia	20	m	320
mia	24	mia	44	m	24	m	20	mea	28	m	28
mia	36	mia	16	m	28	m	424	m	244	m	4
mia	24	mia	52	mia	8	m	4	m	132	m	56
m	24	mia	36	mia	32	m	228	m	4	mia	4

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	12	m	16	m	16	m	4	m	12	m	12
m	44	mia	12	m	4	mia	4	mia	16	m	4
mia	16	m	20			mia	24	m	12	mia	24
mia	20	m	4	Post-2		mia	28	mia	20	m	32
mia	20	mia	20	m	8	mia	20	mia	16	mia	24
m	28	mia	20	m	4	m	28	mia	20		
mea	4	m	12	m	4	mia	8	mia	28	Pre-3	
		mia	24	m	4	mia	20	mia	20	m	20
Pre-3		mia	20	m	16	mea	24	m	16	m	16
m	12	m	24	m	8	m	304	m	24	m	4
m	20	mia	4	m	4			m	4	m	8
m	4	mia	16	m	12			m	20	m	28
m	32	mia	36	m	56	sham	32	mia	24	m	8
m	16	mia	16	m	72	Rep.	2	mia	24	m	12
m	12	mia	16	m	40	Pre-1		m	16	m	68
m	20	mia	20	m	52	m	60	m	24	mia	8
m	72	m	16	m	76	mia	12	mia	24	mia	24
m	16	m	4	m	236	mia	56	mia	44	m	16
m	16	mia	4	m	120	mia	20	m	16	m	12
m	56	mia	24	m	440	mia	36	mia	40	mia	16
m	16	mia	32	m	12	mia	64	m	20	mia	20
m	16	m	12			m	16	m	20	mia	16
m	28	mia	28	Post-3		m	36	mia	28	mia	20
m	16	m	8	m	4	m	32	mia	20	m	20
m	36	m	12	m	4	mia	24	m	24	m	24
m	32	mia	4	mia	4	mia	48	m	20	m	4
m	16	m	24	mia	32	m	56	mia	12	m	40
m	112	mea	4	mia	20	mia	4	mia	28	m	40
m	76	m	212	m	8	mia	28	m	32	mia	36
m	8	m	264	mia	12	m	80	m	4	m	24
m	16	m	4	m	20	m	24	m	24	m	4
m	4	m	4	mia	4	m	28	m	24	mia	4
m	32	m	24	m	16	mia	32	mia	20	mia	28
m	28	m	4	m	20	mia	56	m	28	m	48
m	36	m	4	mia	4	mia	60	mia	8	mia	4
m	4	m	4	m	12	m	20	m	16	mia	24
m	4	mia	36	m	8	m	60	m	16	m	48
m	192	mia	8	mia	20	m	52	m	28	mia	24
m	24	mia	32	m	16	m	36	m	16	mia	52
m	76	m	76	mia	12	m	56	m	16	mea	16
m	52	m	4	mia	16	m	4	mia	20	m	224
		m	8	mia	16	mea	4	m	12	m	92
Post-1		m	8	mia	16			m	8	m	60
m	4	m	4	mia	16	Pre-2		m	20	mia	8
mia	4	m	4	mea	12	mia	24	m	40	mia	40
mia	12	m	8	m	420	mia	12	m	44	mia	12

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
m	24	m	24	m	20	m	36	mia	20	mea	20
		m	20	mea	4	mia	20	m	24	m	184
Post-1		m	24	m	176	mia	28	m	24	m	92
m	8	m	48	m	28	mia	48	mia	8	m	4
m	4	mia	4	m	64	m	48	m	16	m	4
mia	4	m	20	m	64	mea	4	m	20	mia	96
m	16	mia	32	m	60	m	160	mia	8	mia	20
m	8	m	24	m	64	m	4	mea	16	mia	20
mia	4	mea	4	m	4	m	4			mia	24
m	12			mea	8	m	60	Pre-2		mia	28
m	16	Post-2		m	40	m	32	m	116	mia	20
mia	16	m	16	m	52	m	16	m	56	mia	40
mia	8	m	4	m	20	m	60	m	52	m	16
mia	8	m	4	m	4	m	4	m	44	mia	16
m	20	m	4	m	24	m	4	m	4	mia	16
m	12	m	8	m	20	m	24	m	4	mia	20
mia	4	mia	4	mia	4	mia	4	m	28	mia	20
mia	20	mia	20	m	28	m	48	m	148	mia	20
m	20	m	4			m	20	m	4	m	32
m	4	m	4	Post-3		mia	16	m	108	mia	20
m	32	m	8	mia	4	m	20	m	4	mia	32
mia	28	mia	20	m	4	m	32	m	12	m	24
m	20	m	28	m	8			m	36	m	4
m	28	m	4	m	8			m	176	mia	16
mia	4	m	12	mia	4	sham 42		m	8	mia	32
m	16	m	40	m	20	Rep. 2		m	196	m	20
m	24	mia	4	mia	16	Pre-1		m	32	mia	4
m	24	m	32	mia	28	m	24	m	20	m	32
m	28	m	36	mia	16	mia	24	m	76	m	4
m	40	mia	4	mia	28	mia	20	mia	4	m	4
mia	40	m	32	m	24	mia	24	mia	4	mea	4
m	16	mia	12	m	20	mia	40	mia	20		
m	32	mia	16	mia	28	mia	32	m	40	Post-1	
mia	16	m	48	m	12	m	24			mia	4
m	20	m	4	m	24	mia	16	Pre-3		mia	12
mia	28	m	8	m	8	m	60	m	4	m	28
m	20	m	24	m	24	m	4	mia	4	mia	12
m	24	m	16	mia	16	mia	16	m	16	mia	24
m	8	m	4	m	24	mea	28	mia	20	mia	36
m	16	m	12	mia	24	m	400	mia	24	mia	16
mia	48	m	24	m	20	m	64	m	28	mia	24
m	16	m	12	mia	16	mia	16	mia	24	mia	8
m	40	m	4	mia	24	mia	20	mia	16	m	16
m	20	mia	4	mia	24	m	28	mia	28	mia	24
m	16	m	24	mia	48	m	20	m	32	mia	16
m	48	m	4	mia	16	mia	4	mia	16	m	24

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	16	m	80	m	128	mia	28	m	16	mia	20
m	16	m	4	m	4	m	16	mia	16	mia	24
mia	20	m	4	mia	8	mia	20	m	20	mia	24
mia	20	m	60	mia	32	mia	88	mia	4	m	48
m	24	m	28	mia	24	mia	16	mia	56	mia	12
m	12	m	4	mia	16	mia	20	mia	12	mia	24
m	16	m	44	m	24	m	72	mia	12	mia	32
mia	12	m	236	mia	24	m	8	mia	12	mia	16
m	16	m	4	mia	28	mia	4	mia	24	mia	36
m	20	m	16	mia	32	mea	24	m	20	m	24
mia	4	m	148	mia	20	m	300	mia	4	mia	32
m	28	m	44	mia	52	m	52	mia	24	m	36
mia	24	m	52	m	20			m	12	m	20
mia	12	m	32	mia	32	Pre-2		mia	24	mia	80
m	20	m	8	mia	16	m	20	m	16	mia	12
mia	20	m	4	m	4	m	36	m	52	m	32
m	20	m	172	m	4	m	12	m	8	m	16
m	16			m	4	m	12	m	4	mia	24
mea	8	Post-3		m	4	m	36	m	52	m	28
m	396	m	4	mea	12	m	8	m	4	mia	40
mia	8	m	4			mia	32	m	12	mia	52
mia	12	mia	4			mia	68	mia	4	mia	16
m	20	m	12	sham 43		m	16	mia	28	m	12
mia	16	m	4	Rep. 2		mia	8	mia	32	mia	48
m	20	m	4	Pre-1		m	8	m	24	mia	16
mia	8	m	12	mia	20	mia	4	mia	28	m	28
mia	16	mia	4	m	12	m	24	mia	12	mia	24
mia	16	mia	24	m	16	mia	20	m	16	mia	36
mia	28	mia	20	m	4	mia	20	mia	24	m	32
m	12	m	20	mia	24	mia	16	m	12	m	20
m	8	mia	20	m	16	mia	48	mea	4	m	36
m	8	mia	20	m	16	mea	32	mia	452	mia	4
m	4	m	16	mia	20	m	224	m	16	m	8
m	16	mia	24	m	40	m	68	m	28	m	4
mia	4	mia	24	m	24	m	96	mia	4	m	4
		m	28	mia	52	m	76	mia	16	m	4
Post-2		mia	20	mia	48	m	4	m	20	m	4
m	4	mia	24	mia	16	mia	8	m	20	m	32
mia	4	m	24	m	16	mia	28	mia	4	m	4
m	12	mea	24	mia	32	mia	44	mia	16	m	4
mia	68	m	168	mia	32	mia	60			m	4
m	36	m	44	m	12	mea	4	Post-1		m	28
m	4	m	4	m	4			m	4	mea	44
mia	4	m	4	mia	20	Pre-3		m	4		
m	20	m	52	mia	20	mia	8	mia	12	Post-2	
m	12	m	76	m	44	mia	28	m	16	m	12

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
m	20	mia	8	mia	52	m	280	m	4	mia	20
m	40	mia	16	mea	24	m	96	m	48	m	24
m	4	mia	36	mia	284			m	60	mia	12
m	4	m	16	mia	32	Post-1		m	8	m	20
m	12	m	24	m	16	m	4	m	8	mia	12
m	28	mia	44	mia	36	m	4	m	112	m	24
m	44	mia	28	mia	40	m	4	m	364	mia	8
m	80	m	20	mea	24	m	16	m	64	mia	24
m	48	mia	40			m	32	m	312	m	24
mia	4	mia	24	Pre-2		mia	36	mia	4	mia	4
m	12	mia	16	mia	4	m	48	mia	28	mia	16
mia	4	m	24	mia	24	mia	4	mia	24	m	20
m	56	mia	32	mia	24	m	28	mia	20	m	8
m	52	m	20	mia	16	m	12	mia	24	mia	8
m	4	mia	12	mia	28	mia	12	mia	36	mia	16
mia	4	m	36	mia	28	m	16	mia	24	m	12
mia	24	mia	12	m	44	m	20	m	32	mia	4
mia	16	m	24	mia	4	mia	4	m	4	m	220
mia	40	m	12	mia	36	mia	20	mia	4	m	60
m	12	mea	4	mia	24	mia	32				
m	28	m	524	m	16	mia	28	Post-3			
m	16	mia	20	mia	4	m	24	m	8	nor	30
m	36	mia	24	mia	48	m	12	mia	8	Rep.	2
m	16	mia	24	mia	24	m	4	mia	8	Pre-1	
mia	4	mia	36	mia	20	m	8	m	16	m	16
mia	36	m	32	mea	36	mea	4	m	20	mia	8
mia	16	mia	32	m	320	mia	360	mia	24	m	24
mia	48			m	8	mia	28	mia	24	mia	8
m	12			m	28	m	52	mia	24	mia	12
m	20	nor	26	m	4	mia	8	mia	20	mia	40
mia	12	Rep.	2	m	40	mia	20	mia	12	mia	28
m	20	Pre-1		m	64	mia	40	m	16	mia	36
m	24	m	4	mia	52	m	32	mia	4	mia	20
m	4	mia	52	m	36	m	12	mia	12	m	28
m	20	m	20	mia	152	m	12	mia	20	mia	16
mia	20	mia	8	mia	8	m	8	m	16	mia	24
m	24	mia	24	mia	32	m	24	mia	4	mia	28
m	4	mia	40	mia	60	m	16	m	16	m	20
mea	4	mia	28			mia	16	mea	4	mia	4
m	268	mia	32	Pre-3		m	20	m	144	mia	36
m	4	m	32	m	8	mia	28	m	92	mia	48
		mia	24	m	20	m	40	m	12	mia	24
Post-3		mia	36	m	24	m	4	m	4	mea	32
m	4	m	28	m	24	mea	4	m	36	m	388
m	4	mia	12	m	148			mia	64	mia	40
m	4	mia	28	m	424	Post-2		m	8	mia	32

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	32	mia	48	mea	4	m	88	mia	24	m	16
mia	36	mia	20			m	128	mia	16	m	4
mia	24	m	52	Post-2		mia	4	mia	16	mea	4
mea	24	mia	40	m	4	mia	24	mea	28	mia	376
		mia	28	m	32	mia	32	m	340	mia	20
Pre-2		mia	24	m	12	mia	16	m	44	m	16
mia	12	m	40	m	8	m	24	mia	24	m	4
mia	12	mia	4	m	8	mia	4	mia	20	mia	40
m	12	mia	32	mia	12	m	16	mia	12	m	16
mia	12	mia	32	m	44	m	8	mia	56	mia	20
mia	28	m	8	mia	4	mia	4	mia	16	m	20
mia	28	mia	4	m	24	m	36	m	20	m	4
mia	20	mia	48	mia	4	mea	8	mia	12	mea	4
mia	12	mia	8	m	20			mea	16		
mia	32	m	44	m	4			m	432	Post-1	
mia	28	mea	8	m	36	nor 33				mia	4
m	12			mia	4	Rep.2		Pre-3		mia	8
mia	16	Post-1		mia	24	Pre-1		m	16	mia	8
mia	12	m	24	mia	20	m	24	mia	8	mia	12
m	36	mia	4	m	24	m	60	mia	16	m	20
mia	16	m	20	mia	4	m	32	mia	8	m	12
mea	20	mia	20	m	32	mia	16	m	8	m	12
m	492	m	44	m	8	mia	36	mia	8	mia	12
mia	4	mia	12	mia	4	mia	36	m	16	mia	20
mia	20	mia	36	m	28	mia	80	mia	28	mia	40
mia	68	mia	20	mia	24	mia	40	mia	12	mia	16
mia	16	m	32	mia	32	mia	60	mia	16	mia	16
mia	20	mia	20	m	12	mia	68	mia	40	mia	16
mia	28	mia	36	mia	4	mia	52	m	16	mia	20
mia	48	mia	16	mea	24	mia	8	mia	12	mia	16
mia	20	mia	36	m	644	m	76	m	32	m	16
mia	20	m	32	m	8	mia	48	mia	4	mia	16
mia	28	mea	4	m	36	mia	8	mia	32	m	20
mea	32	m	380	mia	4	mea	52	m	36	mia	44
		mia	4	mia	20	m	400	mia	20	m	40
Pre-3		mia	56	m	20	mia	56	m	16	m	16
m	36	m	12			mia	8	m	8	mia	12
mia	8	m	16	Post-3				mia	20	mia	12
m	32	mia	32	mia	4	Pre-2		mia	24	mia	36
mia	24	m	40	m	52	m	4	m	16	m	8
m	32	mia	20	mia	24	mia	4	mia	12	mea	20
m	12	m	16	m	24	m	12	m	16	m	264
mia	28	m	36	mia	28	mia	12	m	4	m	8
m	8	mia	4	mia	32	mia	12	m	24	mia	20
m	72	mia	4	mea	20	mia	12	mia	4	mia	12
mia	8	m	32	m	324	m	12	mia	56	m	12

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	8	mia	12	mia	24	m	32	Post-1		m	92
m	12	mia	28	mia	72	m	176	m	4	m	68
mia	24	mea	20	m	20	mia	32	m	4	m	140
mia	16	m	152	m	88			m	8	m	108
mia	16	mia	196	m	40	Pre-3		m	4	m	196
mia	16	mia	12	mia	4	m	4	m	8	m	264
m	16	mia	20	m	44	mia	8	m	12		
m	32	m	12	m	4	mia	20	mia	4	Post-3	
m	8	mia	20			m	12	m	36	m	4
m	16	mea	20	Pre-2		mia	20	m	24	mia	4
mia	20	m	436	m	4	mia	20	m	44	m	16
mia	8	mia	4	m	4	mia	20	m	8	m	16
m	20	mia	20	m	4	m	24	m	16	mia	20
m	24	mia	16	m	20	mia	32	mia	8	mia	32
mia	4	mia	16	mia	16	mia	24	mia	24	m	24
m	24	mia	16	mia	16	mia	52	mia	24	mia	4
mia	8	mia	16	mia	20	m	16	mia	56	m	24
mia	28	m	20	m	56	mia	28	m	48	m	28
mea	16	mea	4	mia	36	m	36	mia	12	mia	4
				m	16	mia	4	mia	32	m	28
Post-2				mia	20	m	36	m	28	m	20
m	12	nor 35		mia	16	m	44	mea	20	mia	16
m	4	Rep. 2		m	40	m	4	m	152	m	36
m	4	Pre-1		mia	20	m	48	m	4	mea	4
m	4	m	8	m	36	mia	104	m	16	m	172
m	40	mia	4	m	16	m	20	m	4	m	24
m	64	m	24	m	8	m	24	m	52	m	92
m	32	mia	4	mia	24	mia	20	mia	4	m	152
m	4	m	32	m	4	m	44	mia	28	m	32
m	116	mia	28	m	4	mia	28	m	52	mia	80
m	4	mia	28	m	4	mia	20	mia	28	mia	20
m	44	mia	32	m	4	mia	28	m	40	mia	24
m	72	m	40	m	8	mia	32	m	12	mia	24
m	4	mia	12	m	40	m	16	m	4	mia	20
m	168	m	32	m	32	m	24	m	28	m	24
m	4	mia	44	mia	4	mia	72	m	16	mia	44
m	216	mea	20	m	12	m	16	mia	4	m	56
m	28	m	88	m	16	m	12	m	32	mia	12
		mia	32	mia	4	m	28	m	8	m	40
Post-3		m	20	m	36	mia	40	m	8	mea	4
mia	4	m	32	mia	4	mia	28				
mia	12	m	4	mia	60	m	24	Post-2			
mia	20	m	40	m	28	m	104	m	4	nor 37	
mia	16	m	20	mea	4	mia	4	m	68	Rep. 2	
mia	24	m	32	m	284	m	24	m	24	Pre-1	
mia	20	m	36	m	32			m	80	m	32

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
mia	20	mia	28	m	4	m	4	mia	24	mia	32
m	52	mia	28	mia	56	m	4	m	24	m	20
mia	4	m	36	m	16	m	4	mia	20	m	20
mia	52	m	4	mia	4	mia	8	mia	20	m	4
mia	36	mea	4	mia	64	mia	16	mia	20	m	12
m	64			mia	40	m	32	mia	16	m	4
m	4	Pre-3		mia	28	mia	8	m	24	m	8
mia	4	m	4	mia	40	mia	32	mia	4	m	4
m	36	mia	12	mea	28	mia	24	mia	52	mia	20
mea	28	mia	28			mia	20	m	16	m	4
mia	316	mia	28	Post-2		m	24	mia	12	m	8
mia	12	mia	28	m	4	mia	24	mia	8	m	28
m	60	m	36	m	4	mia	12	m	4	mia	8
mia	32	mia	36	m	4	mia	16	m	4	m	32
mea	60	mia	24	m	8	m	24	m	4	mia	168
		mia	28	m	20	m	24	m	8	m	16
Pre-2		mia	36	m	24	m	16	m	20	m	16
m	28	mia	32	m	44	mia	16	mia	4	mia	20
m	20	mia	52	m	16	mia	24	mea	12	m	48
mia	20	m	36	m	4	mia	32	m	344	m	28
mia	16	mea	20	m	4	mia	24	mia	24	mia	4
mia	36	mia	404	m	28	m	28	m	20	m	40
mia	20	mia	52	m	104	m	20	m	8	m	8
m	24	mia	32	m	4	mia	48	m	12	m	4
mia	24	mia	28	m	88	m	12	m	4	m	4
mia	36	mia	44	mia	28	m	16	mia	28	m	4
mia	36	mea	32	m	64	mea	20	m	20	m	4
mia	32			mia	8	m	424	m	16	mia	8
mia	16	Post-1		m	28	m	36			m	4
m	20	m	4	mia	4	m	20	Pre-2		mia	12
mia	16	m	4	m	28	mia	4	m	8	m	8
mia	40	m	4	mia	12	mia	16	m	4	m	20
mia	4	m	4	mia	24	mia	36	mia	4	m	12
mia	20	m	32	m	48	mia	28	m	16	m	16
mia	24	m	20	mia	12	mia	24	mia	16	mia	24
mia	20	m	24	mia	36	mia	28	m	24	m	36
mia	24	m	4	mia	28	mia	16	mia	32	m	4
m	24	m	44	m	32			mia	16	mia	24
m	32	m	4	mia	52			mia	28	m	40
mea	4	mia	4	mia	24	nor	38	mia	12	m	4
m	312	mia	72	mia	24	Rep.	2	m	24	m	4
mia	28	mia	76	mia	28	Pre-1		mia	8	m	20
mia	8	mia	76	m	40	m	56	m	20	m	4
mia	24	mia	32	mea	8	m	300	m	12	m	4
mia	28	mea	56			mia	4	m	24	m	4
mia	28	m	352	Post-3		mia	28	mia	16	m	4

Table 5 (cont'd.)

S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt	S and beh.	irt
m	4	m	4	m	24	m	16	mia	8
m	36	mia	4	m	4	m	28	mia	32
m	4	m	12	m	28	m	4	m	32
m	4	m	8	m	12	m	8	m	16
mia	8	mia	12	m	20	m	28	m	16
m	8	m	16	m	52	m	4	mia	16
m	12	mia	12	m	4	m	124	m	48
m	4	m	12	m	8			mia	16
m	20	m	12	m	20	Post-3		m	40
m	4	mia	8	m	12	m	4	mia	4
m	4	mia	36	mea	4	m	4	m	64
		m	20	m	188	mia	4	m	8
Pre-3		mia	16	m	48	mia	16	m	20
m	44	m	20	m	12	m	24	m	12
m	16	m	24	m	12	mia	12	mia	12
m	28	m	8	mia	92	m	20	m	44
m	20	m	20			m	4	m	12
m	48	m	4	Post-2		mia	8	m	20
m	56	m	24	m	12	mia	24		
m	120	m	8	m	20	m	20		
m	24	mia	8	m	4	m	12		
m	56	m	28	m	4	mia	16		
m	24	m	12	m	28	m	16		
m	24	m	8	m	12	m	12		
m	16	m	8	m	16	m	8		
m	8	m	16	m	8	mia	4		
m	4	m	4	m	4	m	24		
m	20	m	24	m	28	mia	4		
m	140	m	16	m	4	mia	32		
m	32	m	16	m	28	m	16		
m	4	m	16	m	4	m	12		
m	40	m	12	m	4	m	4		
m	44	m	4	m	36	m	8		
m	4	m	20	m	44	m	8		
m	16	m	28	m	4	m	4		
m	8	m	24	m	72	m	8		
m	8	m	20	m	4	m	4		
m	16	m	4	m	28	m	8		
m	24	m	4	m	4	mea	12		
m	8	m	4	m	16	m	284		
m	40	m	8	m	44	m	16		
m	24	m	24	m	160	m	44		
m	248	m	4	m	84	m	32		
m	8	m	12	m	148	mia	4		
		m	32	m	16	m	20		
Post-1		mia	20	m	12	m	20		

APPENDIX C

APPENDIX C

Table 6

Raw data: postejaculatory responses not occurring within 20 minute sessions

Subject	Rep.	Session	Response	Interval in seconds
cing 2	1	Pre-2	m	236
		Pre-3	m	304
		Post-3	m	248
cing 6	1	Pre-2	mia	352
		Post-1	m	144
		Post-3	m	372
cing 7	1	Pre-1	mia	484
		Pre-3	m	500
		Post-1	m	292
		Post-3	m	452
cing 12	1	Pre-1	mia	104
		Post-2	m	328
cing 18	1	Pre-1	mia	232
neo 9	1	Post-1	m	404
neo 19	1	Pre-1	mia	400
sham 1	1	Pre-1	mia	516
sham 3	1	Pre-1	mia	536
		Post-1	m	460
		Post-2	m	260
		Post-3	m	236
sham 10	1	Post-3	m	432
sham 22	1	Pre-2	m	352
		Post-2	m	400
nor 4	1	Pre-1	mia	396
nor 8	1	Pre-3	m	324
nor 11	1	Pre-3	m	372
		Post-2	m	264
		Post-3	m	304
nor 13	1	Pre-1	mia	412
		Pre-3	m	208
		Post-1	m	416
nor 15	1	Pre-3	m	300
		Post-1	m	352
		Post-3	m	392
nor 17	1	Post-1	m	264

Table 6 (cont'd.)

Subject	Rep.	Session	Response	Interval in seconds
		Post-2	m	304
cing 24	2	Pre-2	mia	420
		Pre-3	m	356
cing 28	2	Pre-2	m	412
		Post-2	m	304
cing 29	2	Pre-3	m	472
		Post-3	m	276
cing 34	2	Pre-1	m	300
cing 39	2	Pre-2	mia	484
		Pre-3	m	460
		Post-2	m	184
		Post-3	m	392
neo 27	2	Pre-1	m	572
		Pre-2	m	348
neo 31	2	Pre-1	m	304
neo 36	2	Pre-1	m	344
		Pre-2	m	364
		Post-3	m	248
neo 40	2	Pre-1	m	320
		Pre-3	m	288
		Post-1	m	280
neo 41	2	Pre-2	m	480
		Pre-3	m	280
		Post-2	m	236
sham 23	2	Pre-1	m	260
		Pre-2	m	156
		Pre-3	mia	388
sham 25	2	Pre-1	m	224
		Pre-2	m	164
sham 32	2	Pre-1	m	442
		Post-1	m	228
sham 42	2	Pre-1	m	320
		Pre-3	m	260
		Post-1	m	232
sham 43	2	Pre-2	m	412
		Post-1	m	132
nor 26	2	Pre-1	m	368
		Post-1	m	364
nor 30	2	Pre-1	m	392
		Pre-2	m	392
		Pre-3	m	560
		Post-1	m	404
		Post-3	m	472
nor 33	2	Pre-3	m	216
		Post-1	m	268
		Post-3	m	140
nor 35	2	Post-3	m	268

Table 6 (cont'd.)

Subject	Rep.	Session	Response	Interval in seconds
nor 37	2	Pre-1	mia	428
		Pre-2	m	564
		Pre-3	mia	552
		Post-1	m	344
		Post-2	m	456

LIST OF REFERENCES

LIST OF REFERENCES

Bard, P., and Mountcastle, V. B. Some forebrain mechanisms involved in expression of rage with special reference to suppression of angry behavior. Res. publ. ass. ner. ment. Dis., 1948, 27, 362-404.

Barker, D. J. Brain map. Private communication, 1966.

Barker, D. J., and Thomas, G. J. Ablation of cingulate cortex in rats impairs alternation learning and retention. J. comp. physiol. Psychol., 1965, 60, 353-359.

Barker, D. J., and Thomas, G. J. Effects of regional ablation of midline cortex on alternation learning by rats. Physiol. & Behav., 1966, 1, 313-317.

Beach, F. A. Effects of cortical lesions upon the copulatory behavior of male rats. J. comp. Psychol., 1940, 29, 193-239.

Beach, F. A. Copulatory behavior of male rats raised in isolation and subjected to partial decortication prior to the acquisition of sexual experience. J. comp. Psychol., 1941, 31, 457-470.

Beach, F. A. Characteristics of masculine "sex drive". In M. R. Jones (Ed.), Nebraska symposium on motivation. University of Nebraska Press, Lincoln, 1956, 1-31.

Beach, F. A., and Jordan, L. Sexual exhaustion and recovery in the male rat. Quart. j. exp. Psychol., 1956, 8, 121-133.

Beach, F. A., and Whalen, R. E. Effects of ejaculation on sexual behavior in the male rat. J. comp. physiol. Psychol., 1959, 52, 249-254.

Bermant, G., Glickman, S. E., and Davidson, J. Effects of limbic lesions on copulatory behavior of male rats. J. comp. physiol. Psychol., 1968, 65, 118-125.

Brady, J. V., and Nauta, W. J. H. Subcortical mechanisms in emotional behavior: affective changes following septal forebrain lesions in the albino rat. J. comp. physiol. Psychol., 1953, 46, 339-346.

Brutkowski, S., and Mempel, E. Disinhibition of inhibitory conditional responses following selective brain lesions in dogs. Science, 1961, 134, 2040-2041.

Bunnell, B. N., Kriel, J., and Flesher, C. K. Effects of median cortical lesions on the sexual behavior of the male hamster. J. comp. physiol. Psychol., 1966, 61, 492-495.

Bunnell, B. N., and Pinder, G. D. The effects of median cortical lesions on the hoarding behavior of the hamster. Paper read at the Southern Society for Philosophy and Psychology, Lexington, Kentucky, March, 1964.

Candland, D. K., Horowitz, S. H., and Culbertson, J. C. Acquisition and retention of acquired avoidance with gentling as reinforcement. J. comp. physiol. Psychol., 1962, 55, 1062-1064.

Cornwell, P. Behavioral effects of orbital and proreal lesions in cats. J. comp. physiol. Psychol., 1966, 61, 50-58.

Davis, C. D. The effect of ablations of neocortex on mating, maternal behavior and the production of pseudopregnancy in the female rat on copulatory activity in the male. Amer. j. Physiol., 1939, 127, 374-380.

Dewsbury, D. A quantitative description of the behavior of rats during copulation. Behavior, 1967, 29, 154-178.

Ellen, P., and Powell, E. W. Effects of septal lesions on behavior generated by positive reinforcement. Exper. Neurol., 1962, 6, 1-11.

Ellen, P., Wilson, A. S., and Powell, E. W. Septal inhibition and timing behavior in the rat. Exper. Neurol., 1964, 10, 120-132.

Glickstein, M., Quigley, W. A., and Stebbins, W. C. Effect of frontal and parietal lesions on timing behavior in monkeys. Psychon. Sci., 1964, 1, 265-266.

Gross, C., Chorover, S., and Cohen, S. Caudate, cortical, hippocampal and dorsal thalamic lesions in rats: alternation and Hebb-Williams maze performance. Neuropsychologia, 1965, 3, 53-68.

Kaada, B. R., Rasmussen, E. W., and Kveim, O. Impaired acquisition of passive avoidance behavior by subcallosal, septal, hypothalamic, and insular lesions in rats. J. comp. physiol. Psychol., 1962, 55, 661-670.

Larsson, K. Mating behavior in male rats after cerebral cortex ablation. I. Effects of lesions in the dorsolateral and median cortex. J. exp. Zool., 1962, 151, 167-176.

Larsson, K. Mating behavior in male rats after cerebral cortex ablation. II. Effects of lesions in the frontal lobes compared to lesions in the posterior half of the hemispheres. J. exp. Zool., 1964, 155, 203-213.

Lubar, J. Effect of medial cortical lesions on the avoidance behavior of the cat. J. comp. physiol. Psychol., 1964, 58, 38-46.

Lubar, J., and Perachio, A. A. One-way and two-way learning and transfer of an active avoidance response in normal and cingulectomized cats. J. comp. physiol. Psychol., 1965, 60, 46-52.

Lyon, M., and Harrison, J. M. The effects of certain neural lesions in the rat on the reaction to a noxious stimulus. I. The limbic region. J. comp. Neurol., 1959, 111, 101-114.

McCleary, R. A. Response specificity in the behavioral effects of limbic lesions in the cats. J. comp. physiol. Psychol., 1961, 54, 605-613.

McCleary, R. A. Response-modulating functions of the limbic system: initiation and suppression. In Stellar, E., and Sprague, J. M. (Eds.), Progress in physiological Psychology, New York: Academic Press, 1966, Volume 1, pp. 210-272.

Michal, E. K. The effects of lesions in the limbic system on courtship and mating behavior of male rats. Unpublished doctoral dissertation, University of Illinois, 1965. Discussed by Thomas, G. J., Hostetter, G., and Barker, D. J. in Behavioral functions of the limbic system. In Stellar, E., and Sprague, J. M. (Eds.), Prog. physiol. Psychol., V. 2, New York: Academic Press, 1968, pp. 230-311.

Moore, R. Y. Effects of some rhinencephalic lesions on retention of conditioned avoidance behavior in cats. J. comp. physiol. Psychol., 1964, 57, 65-71.

Peretz, E. The effects of lesions of the anterior cingulate cortex on the behavior of the rat. J. comp. physiol. Psychol., 1960, 53, 540-548.

Pribram, K. H., Lim, H., Poppen, R., and Bagshaw, M. Limbic lesions and the temporal structure of redundancy. J. comp. physiol. Psychol., 1966, 61, 368-373.

Pribram, K. H., and Weiskrantz, L. A comparison of the effects of medial and lateral cerebral resections on conditioned avoidance behavior of monkeys. J. comp. physiol. Psychol., 1957, 50, 74-80.

Pribram, K. H., Wilson, W. A., Jr., and Connors, J. Effects of lesions of the medial forebrain on alternation behavior of rhesus monkeys. Exper. Neurol., 1962, 6, 36-47.

Schwartzbaum, J. S., Kellicutt, M., Spieth, T. M., and Thompson, J. B. Effects of septal lesions in rats on response inhibition associated with food-reinforced behavior. J. comp. physiol. Psychol., 1964, 58, 217-224.

Slotnick, B. M. Disturbances of maternal behavior in rats following lesions of the dorsal limbic cortex. Behavior, 1967, 29, 204-236.

Stamm, J. S. Control of hoarding activity in rats by median cerebral cortex. J. comp. physiol. Psychol., 1954, 47, 21-27.

Stamm, J. S. The function of the median cerebral cortex in maternal behavior of rats. J. comp. physiol. Psychol., 1955, 48, 347-356.

Stamm, J. S. Function of the prefrontal cortex in timing behavior in monkeys. Exp. Neurol., 1963, 7, 87-97.

Stamm, J. S. Function of cingulate and prefrontal cortex in frustrative behavior. Acta Biologiae Experimentalis, 1964, 24, 27-36.

Thomas, G. J., Hostetter, G., and Barker, D. J. Behavioral functions of the limbic system. In Stellar, E., and Sprague, J. M., (Eds.), Progress in physiological Psychology, Volume 2, New York: Academic Press, 1968, pp. 230-311.

Thomas, G. J., and Otis, L. S. Effects of rhinencephalic lesions on conditioning of avoidance responses in the rat. J. comp. physiol. Psychol., 1958, 51, 130-134.

Thomas, G. J., and Slotnick, B. Effects of lesions in the cingulum on maze learning and avoidance conditioning in the rat. J. Comp. physiol. Psychol., 1962, 55, 1085-91.

Thomas, G. H., and Slotnick, B. M. Impairment of avoidance responding by lesions in cingulate cortex in rats depends on food drive. J. comp. physiol. Psychol., 1963, 56, 959-964.

Thompson, R., and Langer, S. K. Deficits in position reversal learning following lesions of the limbic system. J. comp. physiol. Psychol., 1963, 987-995.

Trafton, C. L. Effects of septal and cingulate cortex lesions on conditioned suppression of activity and avoidance behavior in rats. J. comp. physiol. Psychol., 1967, 63, 191-197.