impedance is not necessarily directly related to these responses, nor to the retention of firmness usually obtained and the increased permeability reported at high CO_2 concentrations[14].

There is evidence that daminozide application may result in disorders in apples[15] and another report (in preparation) will discuss the association of daminozide concentrations and breakdown apparent in these fruit. It is possible that the effect of daminozide in increasing permeability, thus potential breakdown, is often present but not revealed unless the conditions inducing senescence occur. It is also certain that the effect of daminozide upon permeability and any latent effect upon physiological breakdown, is concentration dependent. Although permeability changes may occur as one physiological effect of daminozide, breakdown may occur only if the concentration is higher than commercially recommended or other conditions induce senescence.

It is obvious that daminozide-induced disorders would be associated with membrane breakdown and cellular disorganization which would result in decreased impedance[4], although which is cause and which effect is not clear. On the other hand, calcium is known to maintain membrane structure and function, and cellular integrity[10], and in so doing presumably decrease the incidence of disorders in apples as it has been shown to do[16].

Research is continuing to relate impedance to physiological and physical changes in apple fruit.

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Persistence of infradian body weight cycles in castrated dormice *(Glis glis)*

J.E. Joy[1]

Department of Zoology, University of Toronto, Toronto (Canada M5S 1A1), 24 November 1980

Summary. Male dormice were castrated at 2 phases of their infradian body weight cycles. No consistent changes were found in cycle period, amplitude, or absolute weights of the dormice following castration. Unlike other mammals, body weights of dormice appear unaffected by castration. Although both body weight and reproductive condition vary on an infradian basis, the changes in body weight appear to be programmed independently from changes in gonadal function.

In both natural and controlled environmental conditions, dormice *(Glis glis)* show endogenous cycles in body weight which are several weeks to a couple months long[2]. These infradian cycles have been confirmed in many independent studies[3-7]. Reproductive condition in male dormice has been shown to vary with the body weight cycle[8]. The control mechanisms of these cycles are not known. It is well documented that gonadal hormones influence body weight in mammals, including rodents, ungulates, carnivores, and primates[4]. Hence there may be a causal relationship between the body weight and reproductive cycles in dormice.

In general, orchiectomy causes a decrease in body weight[9]; exceptions to this include the golden hamster and Mongolian gerbil in which orchiectomy causes an increase in body weight[10]. Among the rodents that show a weight decrease after orchiectomy, several species (e.g. Djungarian hamsters[11] and hedgehogs[12] are similar to dormice in that they show body weight cycles in conjunction with reproductive cycles. In rodents which show body weight cycles, reproductive competence is typically associated with low body weights[13]. In dormice, however, reproductive competence appears to be associated with the high body weight phase of their infradian cycles[8]. In this respect, dormice resemble Djungarian hamsters rather than the other rodents which show body weight cycles. If dormice are like Djungarian hamsters in their response to orchiectomy, then orchiectomy should result in a decrease in body weight[14].

Castration has also been shown to affect circadian cycles. In male mice, gonadectomy results in a lenghtening of circadian cycles[15]. If the dormouse body weight cycle is dependent on the circadian system, then castration might also alter the period of this infradian cycle.

To determine whether the body weight cycle is dependent on the presence of gonadal hormones, male dormice were castrated at either the high weight phase or the low weight phase of their body weight cycles.

Methods. Animals were obtained from a dealer in France (STACEL). For at least 60 days prior to castration and for the duration of the experiment, they were maintained at 21 ± 3 °C on a 12:12 h light/dark cycle. They were provided with nesting material and given food (ground Purina chow) and water ad libitum, with the exception of 2 animals which were initially given the same food in pellet form and later switched to ground chow (figure). Animals were kept individually in cages measuring $19 \times 22 \times 37$ cm and weighed weekly to the nearest gram. 10 adult males selected on the basis of showing clearly defined body weight cycles (> 20 g amplitude), were bilaterally castrated under

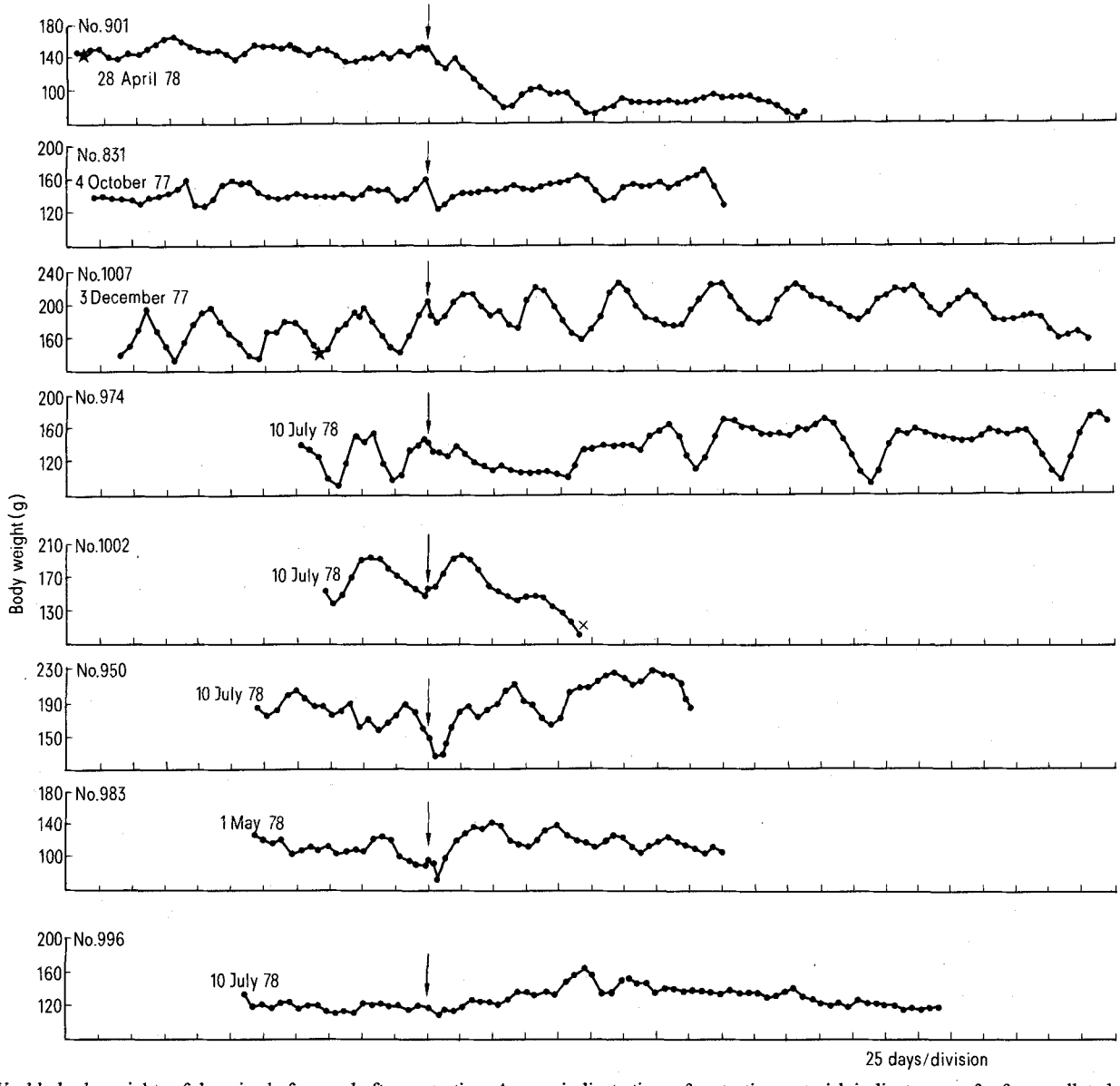
Nembutal anesthesia (75 g/kg). Of these, only the 7 animals surviving more than 80 days after castration are included in the analysis. 4 of these dormice were castrated at the high weight phase and 3 were castrated at the low weight phase. An additional non-cycling male that had maintained an almost constant body weight (range 111–124 g) for 135 days was also castrated.

Results and discussion. All 7 cycling animals continued to show body weight cycles after castration. The inter- and intra-individual variation in period and amplitude of these cycles is well within the range seen in intact animals[2]. The non-cycling animal (No. 996) showed 2 cycles and then resumed a relatively constant weight (figure). These 2 cycles were 32 and 19 g in amplitude and 35 and 42 days long, respectively. Cycle period, in this case, was measured between trough weights.

There were no consistent changes in the period of the body weight cycles. For the 3 animals in which comparison of cycle periods before and after castration was possible, the average period was 65 ± 23 (SD) days before and 65 ± 19 days after castration. This lack of period effect is consistent with, if not strong evidence for, the conclusion of Mrosovsky et al. that the circadian system is probably not involved in the organization of the infradian body weight cycle.

There was no tendency for animals to show a change in cycle amplitude. For the 5 animals in which amplitude could be compared between cycles immediately before and after castration, average amplitudes were 40 ± 23 and 42 ± 17 g, respectively. There were no consistent phase shifts after castration. Cycle form within animals was quite consistent. For example, No. 901 showed low amplitude cycles of similar period before and after castration, No. 831 showed exceptionally long cycles before and after castration, and No. 950 and No. 983 showed 'poor' cycles before and after castration (see figure).

Peak weights immediately following castration were higher than peak weights immediately before castration in 6 out of 7 cases. The average difference between pre- and post-castration body weights was 6 ± 27 g. Intact males kept



Weekly body weights of dormice before and after castration. Arrows indicate time of castration, asterisk indicates transfer from pelleted to powdered food, and X indicates animal's death. Initial dates of experiment are indicated for individual animals.

under similar conditions show an average gain of 7 ± 6 g between peaks of 2 consecutive cycles (Mrosovsky et al.[2], see figure 1 therein), indicating that this slight increase in weight after castration was probably due to a growth component underlying the body weight cycle. The non-cycling animal averaged 119 ± 4 g before castration and 129 ± 9 g for 216 days after the 2 post-castration cycles.

Thus it appears that the body weights of dormice, unlike those of other mammals, are unaffected by castration. It is clear that infradian cycles of body weight can persist in the absence of gonadal hormones. Although both body weight and reproductive condition vary on an infradian basis, the changes in body weight appear to be programmed independently from changes in gonadal frunction.

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Evidence for a constant number of available sweet receptor sites at threshold concentrations of sugars

G.G. Birch and S.L. Munton

National College of Food Technology, University of Reading, St. Georges Avenue, Weybridge, Surrey, KT13 ODE (England), 24 October 1980

Summary. Intensity/time plots of sweetness produced by different molecules allow putative 'accession efficiencies' of these molecules and their affinities with the taste receptor to be calculated. Results suggest that affinities of the different molecules are in the same order as threshold concentrations and that a constant number of available receptors exist for a related family of structures near threshold concentrations.

Although recent studies of intensity/time relationships in sweet substances[1,2] have invoked the concept of a localized concentration and approach of stimuli to taste receptors[3], there is still a lack of evidence about multistage effects in taste chemoreception. The approach of sapid substances to receptors has been envisaged[1,2] as an irreversible orderly queue by means of which stimuli cause a cyclic open-shut process at the ionophor trigger and on the basis of this model, separate mechanisms may account for the intensity and persistence of response. Intensity may be viewed as the resultant of numbers of queues occupied and the stereochemical 'fit' of the stimulus with the ionophor trigger, whereas persistence of response represents the time for queues to empty and is thus related to queue length. The queue model naturally leads to questions about the accession of sapid molecules to receptors and the intrinsic activity of sweet pharmacophores, and it now seems possible to apply psychophysical data to illuminate receptor function. Moskowitz[4] has demonstrated that taste response (R) obeys power functions of the form $R = kc^n$ where k is a constant, c is concentration of stimulus and n is the exponent of taste. Log/log plots of R and c give straight lines of intercept (log k) and slope n. Moskowitz[4] observed that k increased with increasing temperature while n remained constant. He therefore suggested that k represented the ability of molecules to reach receptors whereas n reflected a more profound interaction between stimulus and receptor depending on chemical structure. In accordance with this suggestion it has recently been shown[5] that the artificial sweetener, saccharin has a similar intercept to sugars at $^1/_{1000}$ of their concentration while the exponent, n, for saccharin was actually lower than the sugars. This may be interpreted as a relatively massive accession efficiency of the lipophilic saccharin molecule, facilitating its approach to the taste cell membrane, in contrast to the poor accession efficiences of the sugars as a group which is in turn reflected as a relatively high threshold for these hydrophilic structures.

We have calculated 'accession efficiences' from intercepts of log/log plots as shown in the table for a number of sweet molecules. Accession efficiency may be regarded as the fraction of sapid molecules presented to receptors which actually accede. Therefore multiplication of 'accession efficiency' by threshold concentration should give moles of sweetener actually acceding at threshold. The table indicates that the sweet molecules fit into families in which the same numbers of molecules accede at threshold despite their varying 'accession efficiency'. The 2 sugar alcohols, sorbitol and xylitol, form one such family, the sugars galactose and fructose form another, and the sugars sucrose, maltose, lactose, glucose and xylose form a third, although this 3rd family may be divided into two with the monosaccharides in one group and the disaccharides in another. These observations signify a constant number of available receptors for molecules in a structurally related group at threshold concentrations and presumably derive from conformational analogy in sugars or their derivatives which possess a sweet pharmacophore. The large difference in the result for galactose and fructose reflects the absence of such conformational definition because these sugars exist in at least 4.1% and 28.0% furanose forms respectively at normal tasting temperatures[7].