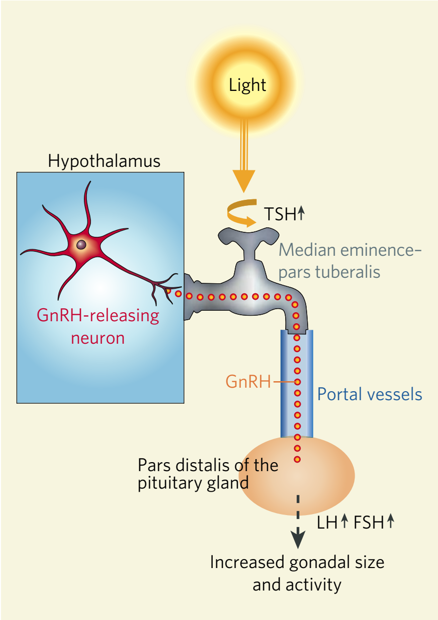

Figure 1 | A light-sensitive hormonal tap. Photoperiodic light signals activate a functional unit at the base of the brain consisting of the region of the hypothalamus known as the median eminence and the pars tuberalis in the pituitary gland. Nakao *et al.* find that thyrotropin (TSH) is released there, leading to the release of the hypothalamic hormone GnRH from neurons that project to this 'tap'. GnRH enters the portal vessels and promotes the release of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) from the pituitary into the systemic circulation, which in turn causes increased gonadal activity.

the Greek word *tanus*, meaning 'stretched' or 'elongated')[5], and their long, thick processes encircle the capillaries and neuronal termini, forming a physical barrier between them[6]. But the structural association of tanycytes with nerve fibres and capillaries is changeable, and so allows modulation of the concentrations of neurohormones released into the capillaries. The capillaries then feed into the portal vessels, and the neurohormones are conveyed to the secondary capillary plexus in the pars distalis, which is the main unit of the anterior pituitary. Here, they trigger the secretion of pituitary hormones to regulate various endocrine organs in the body. This canonical view of the hypothalamic–pituitary system has no role for the pars tuberalis.

The pars tuberalis is composed of small, specialized glandular cells that are different from the endocrine cells of the pars distalis[7]. Significantly, in most species it is located next to the median eminence. The two structures face each other and are separated by a dense capillary plexus that connects to the portal vessels. By means of these local vascular connections, thyrotropin, released from the pars tuberalis cells in response to increased day length, enters the capillary plexus of the median eminence and binds to thyrotropin receptors on the tanycytes encircling the capillaries. Nakao *et al.*[2] find that, once activated, tanycytes induce the expression of various gene transcription factors and enzymes, and undergo conformational changes that allow increased GnRH release into the capillaries. These findings strongly suggest that the pars tuberalis and median eminence form a functional and structural unit.

What are the implications of Nakao and colleagues' findings[2] for the photoperiodic response in mammals? Although the route taken by photoperiodic signals to reach the median eminence–pars tuberalis functional unit is different in birds and mammals, the authors' observations in Japanese quail are likely to hold for mammals too: similar, if not identical, photoperiod-dependent changes in gene expression have been reported in the median eminence and pars tuberalis of the hamster brain[8]. Another implication of Nakao and colleagues' findings is that the median eminence–pars tuberalis complex is the key site responsible for the spontaneous restoration of gonadal activity that occurs after an animal is kept under a photoperiodic condition called photorefractoriness[9]. The incorporation of photorefractoriness into photoperiodic responses (photoperiodicity) gives seasonal breeding animals, whether birds or mammals, greater flexibility in adjusting the length and time of their breeding season.

The transformation of a light signal into endocrine signals is a feature that is shared by the circadian rhythm and photoperiodicity. In the circadian system this transformation is used to entrain circadian clocks throughout the body; for example, light stimulates adrenal glands to secrete glucocorticoid hormones into the systemic circulation[10]. In photoperiodicity, this conversion occurs at the junction of the hypothalamus and the pituitary, as the main target of the photoperiodic signal is the hypothalamic–pituitary–gonadal hormonal axis. There, the light signal induces the release of thyrotropin from pars tuberalis cells, which stimulates tanycytes to 'draw' GnRH into the portal circulation. So, in photoperiodicity, thyrotropin works locally as a tanycyte-stimulating hormone. ■

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50 & 100 YEARS AGO

50 YEARS AGO

'Interpretation of science to the public'. By Sir Lawrence Bragg — It is perennially surprising to find that it is the simpler experiments which have the warmest reception, especially if they can be done on a spectacular scale. The audience likes to see 'the works'. It is of little help to do something mysterious in a box which makes a pointer move over a scale. The simple experiment is effective because it can be grasped completely, and the members of the audience have the pleasurable feeling that it has become a part of their own experience ... The other guiding principle of the popular lecture is that of starting with something with which the audience is thoroughly familiar in every-day life, and leading them further with that as a basis ... [The lecturer] has to put himself in the place of the intelligent layman and realize that ideas and experiences so familiar to him are unexplored country to his listener.

From *Nature* 22 March 1958.

100 YEARS AGO

Lest some readers should infer from your obituary note on Sir Denzil Ibbetson (March 12, p. 443) that this distinguished anthropologist invented the word "godlings" for the rural deities of India, it is worth noting that "godling" was good English in the sixteenth century, and has never been allowed to drop. The Philological Society's "New English Dictionary" quotes Lambarde's "Perambulation of Kent" (1570–6) on raising altars "to this our newe found Godlyng" ... Coleridge preferred "godkin" for a minor deity with masculine attributes, but sanctioned "goddessling". Charles Colton in 1675 permitted a certain cult of "little Goddikins"; Coventry Patmore regarded "godlet" as the more dignified appellative. Anthropologists have therefore had a fairly ample choice; but it should be added that in some of the above examples, at least, Dr. Murray and his coadjutors suspected a "jocular" intention.

From *Nature* 19 March 1908.