

TABLE 1. THE MINIMUM CELL CYCLE TIME IN ROOT TIPS, THE TEMPERATURE AT WHICH IT WAS ESTIMATED AND THE REFERENCE FROM WHICH IT WAS TAKEN IN 31 PLANT SPECIES TOGETHER WITH THEIR TYPE OF LIFE HISTORY

species	cell cycle time/h	temperature/°C	type of life history	reference
<i>Lolium perenne</i> L.	8.6	not given	perennial†	Evans <i>et al.</i> (1970)
<i>Impatiens balsamina</i> L.	8.8	23	perennial†	Van't Hof (1965)
<i>Avena pilosa</i> Bieb.	8.9	25	annual	Yang & Dodson (1970)
<i>Helianthus annuus</i> L.	9.0	23	annual	Van't Hof & Sparrow (1963)
<i>Nicotiana tabacum</i> L.	9.0	22	annual	Gupta (1969)
<i>Avena strigosa</i> Schreb.	9.8	25	annual	Yang & Dodson (1970)
<i>Pisum sativum</i> L.	10.0	23	annual	Van't Hof & Sparrow (1963)
<i>Haplopappus gracilis</i> A. Gray	10.5	not given	annual	Sparvoli <i>et al.</i> (1966)
<i>Triticum aestivum</i> L.	10.5	24	annual	Bayliss (unpublished)
<i>Zea mays</i> L.	10.5	not given	annual	Evans <i>et al.</i> (1970)
<i>Linum usitatissimum</i> L.	10.6	not given	annual	Evans <i>et al.</i> (1970)
<i>Lycopersicon esculentum</i> Mill.	10.6	23	perennial†	Van't Hof (1965)
<i>Crepis capillaris</i> (L.) Wallr.	10.8	23	annual	Van't Hof (1965)
<i>Nicotiana plumbaginifolia</i> Viv.	11.0	22	annual	Gupta (1969)
<i>Lathyrus angulatus</i> L.	12.3	not given	annual	Evans <i>et al.</i> (1970)
<i>Secale cereale</i> L.	12.8	not given	annual	Ayonoadu & Rees (1968)
<i>Vicia faba</i> L.	13.0	23	annual	Van't Hof & Sparrow (1965)
<i>Triticum durum</i> Desf.	14.0	23	annual	Avanzi & Deri (1969)
<i>Lathyrus articulatus</i> L.	14.3	not given	annual	Evans <i>et al.</i> (1970)
<i>Melandrium album</i> Garcke	15.5	25	perennial†	Choudhuri (1969)
<i>Nigella damascena</i> L.	16.5	not given	annual	Evans <i>et al.</i> (1970)
<i>Lathyrus tingitanus</i> L.	16.8	not given	annual	Evans <i>et al.</i> (1970)
<i>Allium cepa</i> L.	17.4	23	perennial	Van't Hof & Sparrow (1963)
<i>Lathyrus hirsutus</i> L.	18.0	not given	annual	Evans <i>et al.</i> (1970)
<i>Tradescantia paludosa</i> E. Anders & R. E. Woodson	18.0	23	perennial	Van't Hof & Sparrow (1963)
<i>Allium fistulosum</i> L.	18.8	23	perennial	Van't Hof (1965)
<i>A. tuberosum</i> Rottl. ex Spreng.	20.6	23	perennial	Van't Hof (1965)
<i>Tulipa kaufmanniana</i> Regel	23.0	23	perennial	Van't Hof & Sparrow (1963)
<i>Hyacinth</i> sp. diploid	24.0	not given	perennial	Evans <i>et al.</i> (1970)
<i>Lilium longiflorum</i> Thunb.	24.0	not given	perennial	Stern & Hotta (1969)
<i>Trillium erectum</i> L.	29.0	23	perennial	Van't Hof & Sparrow (1963)

† Facultative perennial species.

## REFERENCES

- Avanzi, S. & Deri, P. L. 1969 Duration of the mitotic cycle in two cultivars of *Triticum durum*, as measured by <sup>3</sup>H thymidine. *Caryologia* **22**, 187–194.
- Ayonoadu, U. W. & Rees, H. 1968 The regulation of mitosis by B-chromosomes in rye. *Expl Cell Res.* **52**, 284–290.
- Baetcke, K. P., Sparrow, A. H., Naumann, C. H. & Schwemmer, S. S. 1967 The relationship of DNA content to nuclear and chromosome volumes and to radiosensitivity (LD<sub>50</sub>). *Proc. natn. Acad. Sci. U.S.A.* **58**, 533–540.
- Beck, C. 1953 *Fritillaries* London: Faber and Faber.
- Bennett, M. D. 1971 The duration of meiosis. *Proc. R. Soc. Lond. B* **178**, 259–275.
- Bennett, M. D. & Smith, J. B. 1972 The effects of polyploidy on meiotic duration and pollen development in cereal anthers. *Proc. R. Soc. Lond. B* **181**, 81–107.
- Bowen, H. J. M. 1962 Radiosensitivity of higher plants and correlations with cell weight and DNA content. *Radiat. Bot.* **1**, 223–228.
- Bullough, W. S. 1971 Ageing in mammals. *Nature, Lond.* **229**, 608–610.

- Burholt, D. R. & Van't Hof, J. 1971 Quantitative thermal-induced changes in growth and cell population kinetics in *Helianthus* roots. *Am. J. Bot.* **58**, 386-393.
- Choudhuri, H. C. 1969 Late DNA replication pattern in sex chromosomes of *Melandrium*. *Can. J. Genet. Cytol.* **11**, 192-198.
- Commoner, B. 1964 Roles of desoxyribonucleic acid in inheritance. *Nature, Lond.* **202**, 960-968.
- Crick, F. 1971 General model for the chromosomes of higher organisms. *Nature, Lond.* **234**, 25-27.
- Darlington, C. D. 1965 *Cytology*. London: Churchill.
- Evans, G. M., Rees, H., Snell, C. L. & Sun, S. 1970 The relation between nuclear DNA amount and the duration of the mitotic cycle. In *Chromosomes today*. Vol. III (in the Press).
- Evans, H. J. & Savage, J. R. K. 1959 The effect of temperature on mitosis and on the action of colchicine in root meristem cells of *Vicia faba*. *Expl Cell Res.* **18**, 51-61.
- Flamm, W. G. & Birnstiel, M. L. 1964 The nuclear synthesis of ribosomes in cell cultures. *Biochim. biophys. Acta* **87**, 101-110.
- Furuta, Y. 1970 DNA content per nucleus in *Aegilops* species. *Wheat Inf. Serv. Kyoto Univ.* **30**, 20-22.
- Gupta, S. B. 1969 Duration of mitotic cycle and regulation of DNA replication in *Nicotiana plumbaginifolia* and a hybrid derivative of *N. tabacum* showing chromosome instability. *Can. J. Genet. Cytol.* **11**, 133-142.
- Hazarika, M. H. 1966 The cytogenetics of diploid and autotetraploid plant populations. Thesis, University of Wales.
- Hotta, Y. & Stern, H. 1963 Inhibitors of protein synthesis during meiosis and its bearing on intracellular regulation. *J. Cell Biol.* **16**, 259-279.
- Ito, M. & Stern, H. 1967 Studies of meiosis *in vitro*. I. *In vitro* culture of meiotic cells. *Devl. Biol.* **16**, 36-53.
- Jones, G. H. & Rees, H. 1967 Chromosome evolution in *Lolium*. *Heredity, Lond.* **20**, 1-18.
- Jones, R. N. & Rees, H. 1968 Nuclear DNA variation in *Allium*. *Heredity, Lond.* **23**, 591-605.
- Kemp, C. L. 1964 The effects of inhibitors of RNA and protein synthesis on cytological development during meiosis. *Chromosoma* **15**, 652-665.
- Martin, P. G. & Shanks, R. 1966 Does *Vicia faba* have multi-stranded chromosomes? *Nature, Lond.* **211**, 650-651.
- McLeish, J. & Sunderland, N. 1961 Measurements of desoxyribonucleic acid (DNA) in higher plants by Feulgen photometry and chemical methods. *Expl Cell Res.* **24**, 527-540.
- Miksche, J. P. 1967 Variation in DNA content of several gymnosperms. *Can. J. Genet. Cytol.* **9**, 717-722.
- Miksche, J. P. 1971 Intraspecific variation of DNA per cell between *Picea sitchensis* (Bong.) Carr. Provenances. *Chromosoma* **32**, 343-352.
- Paroda, R. S. & Rees, H. 1971 Nuclear DNA variation in *Eu-sorghums*. *Chromosoma* **32**, 353-363.
- Pope, M. N. 1944 Some notes on techniques in barley breeding. *J. Hered.* **35**, 99-111.
- Pegington, C. & Rees, H. 1970 Chromosome weights and measures in the Triticinae. *Heredity, Lond.* **25**, 195-205.
- Rees, H., Cameron, F. M., Hazarika, M. H. & Jones, G. H. 1966 Nuclear variation between diploid angiosperms. *Nature, Lond.* **211**, 828-830.
- Rees, H. & Walters, M. R. 1965 Nuclear DNA and the evolution of wheat. *Heredity, Lond.* **20**, 73-82.
- Rothfels, K., Sexsmith, E., Heimbürger, M. & Krause, M. O. 1966 Chromosome size and DNA content of species of *Anemone*. L. and related genera (Ranunculaceae). *Chromosoma* **20**, 54-74.
- Salisbury, E. J. 1961 *Weeds and aliens*. London: Collins.
- Sparrow, A. H. & Evans, H. J. 1961 Nuclear factors affecting radiosensitivity. I. The influence of nuclear size and structure chromosome complement, and DNA content. In *Brookhaven Symposia in Biology* **14**, 'Fundamental aspects of radiosensitivity', pp. 76-100.

- Sparrow, A. H., Sparrow, R. C., Thompson, K. H. & Schairer, L. A. 1965 The use of nuclear and chromosomal variables in determining and predicting radiosensitivities. In 'The use of induced mutations in plant breeding', Suppl. to *Radiat. Res.* **5**, 101–132.
- Sparvoli, E., Gay, H. & Kaufman, B. P. 1966 Duration of the mitotic cycle in *Haplopappus gracilis*. *Caryologia* **19**, 65–71.
- Stebbins, G. L. 1971 In *Chromosome evolution in higher plants*, London: Edward Arnold Ltd, p. 57.
- Stern, H. & Hotta, Y. 1969 Biochemistry of meiosis. In *Handbook of molecular cytology* (edited by Lima-de-Faria), pp. 520–539. North Holland Publishing Co.
- Turrill, W. B. 1948 In *British plant life*, p. 296. London: Collins.
- Van't Hof, J. 1965 Relationships between mitotic cycle time duration, S period duration and the average rate of DNA synthesis in the root-tip meristem cells of several plants. *Expl Cell Res.* **39**, 48–58.
- Van't Hof, J. & Sparrow, A. H. 1963 A relationship between DNA content, nuclear volume, and minimum mitotic cycle time. *Proc. natn. Acad. Sci. U.S.A.* **49**, 897–902.
- Vassileva-Dryanovska, O. A. 1966a Fertilisation in *Tradescantia*. *Hereditas* **55**, 47–54.
- Vassileva-Dryanovska, O. A. 1966b The induction of haploid embryos and tetraploid endosperm nuclei with irradiated pollen in *Lilium*. *Hereditas* **55**, 160–165.
- Vogel, F. 1964 A preliminary estimate of the number of human genes. *Nature, Lond.* **201**, 847.
- Walker, P. M. B. 1971 Origin of satellite DNA. *Nature, Lond.* **229**, 306–309.
- Wilson, J. Y. 1959 Duration of meiosis in relation to temperature. *Heredity, Lond.* **13**, 262–267.
- Wimber, D. E. 1966 Duration of the nuclear cycle in *Tradescantia* root-tips at three temperatures as measured with <sup>3</sup>H thymidine. *Am. J. Bot.* **53**, 21–24.
- Yang, D. P. & Dodson, E. O. 1970 The amounts of nuclear DNA and the duration of DNA synthesis period (S) in related diploid and autotetraploid species of oats. *Chromosoma* **31**, 309–320.