# Chapter 2 The Alarm Phase and the General Adaptation Syndrome

# Two Aspects of Selye’s Inconsistent Legacy

R. McCarty

Vanderbilt University, Nashville, TN, USA

# References

1.[Neylan TC. Hans Selye and the field of stress research.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink1rf0010) *[J Neuropsychiatry](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink1rf0010)*[. 1998;10:230–231.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink1rf0010)

2.[Selye H. A syndrome produced by diverse nocuous agents.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink2rf0015) *[Nature](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink2rf0015)*[. 1936;138:32.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink2rf0015)

3.[Selye H.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink3rf0020) *[The Stress of Life.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink3rf0020)* [revised ed. New York: McGraw-Hill; 1978.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink3rf0020)

4.[Szabo S. The creative and productive life of Hans Selye: a review of his major scientific discoveries.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink4rf0025) *[Experientia](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink4rf0025)*[. 1985;41:564–567.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink4rf0025)

5.[TachØ Y, Brunnhuber S. From Hans Selye’s discovery of biological stress to the identification of corticotropin-releasing factor signaling pathways: implications in stress-related functional bowel diseases.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink5rf0030) *[Ann N Y Acad Sci](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink5rf0030)*[. 2008;148:29–41.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink5rf0030)

6.[Guillemin R. A personal reminiscence of Hans Selye.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink6rf0035) *[Experientia](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink6rf0035)*[. 1985;41:560–561.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink6rf0035)

7.[TachØ J, Selye H. On stress and coping mechanisms.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink7rf0040) *[Issues Ment Health Nurs](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink7rf0040)*[. 1985;7:3–24.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink7rf0040)

8.[Ader R. Psychosomatic and psychoimmunologic research.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink8rf0045) *[Psychosom Med](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink8rf0045)*[. 1980;42:307–321.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink8rf0045)

9.[Elliott GR, Eisdorfer C.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink9rf0050) *[Stress and Human Health.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink9rf0050)* [New York: Springer; 1982.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink9rf0050)

10.[Munck A, Guyre PM, Holbrook NJ. Physiological functions of glucocorticoids in stress and their relation to pharmacological action.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink10rf0055) *[Endocr Rev](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink10rf0055)*[. 1984;5:25–44.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink10rf0055)

11.[Goldstein DS.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink11rf0060) *[Adrenaline and the Inner World.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink11rf0060)* [Baltimore, MD: The Johns Hopkins University Press; 2006.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink11rf0060)

12.[Mason JW. A historical view of the stress field: part I.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink12rf0065) *[J Hum Stress](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink12rf0065)*[. 1975;1:6–12.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink12rf0065)

13.[Mason JW. A historical view of the stress field: part II.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink13rf0070) *[J Hum Stress](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink13rf0070)*[. 1975;1:22–36.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink13rf0070)

14.[Chrousos GP. Stress and disorders of the stress system.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink14rf0075) *[Nat Rev Endocrinol](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink14rf0075)*[. 2009;5:374–381.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink14rf0075)

15.[McEwen BS.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink15rf0080) *[The End of Stress as We Know It.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink15rf0080)* [Washington, DC: Joseph Henry Press; 2002.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink15rf0080)

16.[McEwen BS. The neurobiology and neuroendocrinology of stress: implications for post-traumatics stress disorder from a basic science perspective.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink16rf0085) *[Psychiatr Clin N Am](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink16rf0085)*[. 2002;25:469–494.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink16rf0085)

17.[McEwen BS. Physiology and neurobiology of stress and adaptation: central role of the brain.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink17rf0090) *[Physiol Rev](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink17rf0090)*[. 2007;87:873–904.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink17rf0090)

18.[McCarty R. Stress research: principles, problems and prospects. In: Van Loon GR, Kvetnansky R, McCarty R, Axelrod J, eds.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink18rf0095) *[Stress: Neurochemical and Humoral Mechanisms](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink18rf0095)*[. New York: Gordon and Breach; 1989:3–13.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink18rf0095)

19.[Groves PH, Thompson RF. Habituation: a dual-process theory.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink19rf0100) *[Psychol Rev](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink19rf0100)*[. 1970;77:419–450.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink19rf0100)

20.[McCarty R, Gold PE. Catecholamines, stress, and disease: a psychobiological perspective.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink20rf0105) *[Psychosom Med](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink20rf0105)*[. 1996;58:590–597.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink20rf0105)

21.[McCarty R, Horwatt K, Konarska M. Chronic stress and sympathetic-adrenal medullary responsiveness.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink21rf0110) *[Soc Sci Med](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink21rf0110)*[. 1988;26:333–341.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink21rf0110)

22.[Fernandes GA, Perks P, Cox NK, et al. Habituation and cross-sensitization of stress-induced hypothalamic-pituitary- adrenal activity: effect of lesions in the paraventricular nucleus of the thalamus or bed nuclei of the stria terminalis.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink22rf0115) *[J Neuroendocrinol](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink22rf0115)*[. 2002;14:593–602.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink22rf0115)

23.[Babb JA, Masini CV, Day HE, et al. Habituation of hypothalamic-pituitary-adrenocortical axis hormones to repeated homotypic stress and subsequent heterotypic stressor exposure in male and female rats.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink23rf0120) *[Stress](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink23rf0120)*[. 2014;17:224–234.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink23rf0120)

24.[Belda X, Daviu N, Nadel R, et al. Acute stress-induced sensitization of the pituitary-adrenal response to heterotypic stressors: independence of glucocorticoid release and activation of CRH1 receptors. *Horm Behav*. 2012;62:515–524.](file:///D:\womat-filecopy\Ed-Reference\0002570111.html#rfLink24rf0125)

25.[Uschold-Schmidt N, Nyuyki KD, Fuchsl AM, et al. Chronic psychosocial stress results in sensitization of the HPA axis to acute heterotypic stressors despite a reduction of adrenal in vitro ACTH responsiveness.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink25rf0130) *[Psychoneuroendocrinology](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink25rf0130)*[. 2012;37:1676–1687.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink25rf0130)

26.[Selye H. Stress and disease.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink26rf0135) *[Science](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink26rf0135)*[. 1955;122:625–631.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink26rf0135)

27.[Selye H. What is stress?](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink27rf0140) *[Metabolism](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink27rf0140)*[. 1956;5:525–530.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink27rf0140)

28.[Selye H. The evolution of the stress concept.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink28rf0145) *[Am Sci](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink28rf0145)*[. 1973;61: 692–699.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink28rf0145)

29.[Selye H. Implications of stress concept.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink29rf0150) *[N Y State J Med](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink29rf0150)*[. 1975; 75:2139–2145.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink29rf0150)

30.[Selye H. Confusion and controversy in the stress field.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink30rf0155) *[J Hum Stress](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink30rf0155)*[. 1975;1:37–44.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink30rf0155)

31.[Pacak K, Palkovits M, Yadid G, et al. Heterogeneous neurochemical responses to different stressors: a test of Selye’s doctrine of nonspecificity.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink31rf0160) *[Am J Physiol](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink31rf0160)*[. 1998;275:R1247–R1255.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink31rf0160)

32.[Pacak K, Palkovits M. Stressor specificity of central neuroendocrine responses: implications for stress-related disorders.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink32rf0165) *[Endocr Rev](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink32rf0165)*[. 2001;22:502–548.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink32rf0165)

33.[Mason JW. A re-evaluation of the concept of nonspecificity in stress theory.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink33rf0170) *[J Psychiatr Res](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink33rf0170)*[. 1971;8:323–333.](file:///D:\\womat-filecopy\\Ed-Reference\\0002570111.html" \l "rfLink33rf0170)