

## INDEX

- Abernethy, John, 33, 35, 37  
 acephalous infant, 46–7  
 agency and determinism *see* intercontingency  
 Aldersgate School of Medicine, 21  
 Allarton, George, 153  
 Allman, George, 13, 41, 93, 134, 141, 142, 165  
 ‘alternation of generations’, 93, 107, 118–19, 120, 135, 138  
 analysis:synthesis, 3, 18, 23, 25–6  
   analysis as dissection and synthesis as development, 66, 68  
   as a clarifying and rationalizing tool for reformers, 22–3, 26, 59  
   definition of, 14, 15  
   emergence in France, 14–16  
   Newtonianism and analysis:synthesis, 15, 25  
   populism of, 15, 29  
   relationships turned into properties, 7, 25–6, 62  
 Anderson, John, 76, 77, 80  
 annelids, 56, 155  
   earthworms, 51, 52, 56, 57, 72, 91–2  
   *Nais*, 91, 92, 128  
   *Nereis*, 91, 92, 96, 136, 137  
 aquaria (vivaria), 4, 123–5, 126, 128, 129, 143  
 Aristotle, 38, 47, 93–4  
 asexual reproduction *see* regeneration and reproduction, blurred distinction between  
 Badham, Charles David, 6, 51–2, 58, 125  
 Baly, William, 20, 40  
 Barclay, John, 33, 35, 176n64  
 Barry, Martin, 6, 8, 111, 113–15, 118, 139, 140, 194n24  
 Beale, Lionel Smith, 141  
 Bell, Charles, 40, 44, 46, 51, 57, 58, 61, 76, 84  
 Bell, Thomas, 132  
 Bell-Magendie law, 44  
 Bennett, James R., 21  
 Bentham, Jeremy, 10, 14, 25, 59, 174n38, 174n43  
   as Newton of morality, 25  
   using analysis:synthesis to clarify, 22–4, 26, 29, 174n31  
 Bernard, Claude, 55  
 Bichat, Xavier, 16, 43, 61  
 biological individuality, 9, 46, 48, 51–2, 145, 146, 155  
   spatial definition, 96, 119, 120, 121, 128  
   temporal definition, 119, 120–1, 133–4, 165–6  
 Blackwall, John, 97  
 body part independence, 17–19, 43, 49, 50–1  
   *see also* vivisection  
 Bonnet, Charles, 51, 57, 91, 92, 145, 148  
 British Association for the Advancement of Science, 45, 97, 138, 147, 153, 156, 164  
 British Museum, 36, 37, 39, 40, 41, 108  
 Buckland, William, 40  
 buds *see* reproductive germs  
 Busk, George, 132, 141, 150, 197n6  
 Carpenter, William Benjamin, 6, 8, 57, 89, 91, 102, 144, 155, 165–6, 188n53, 194n24  
   biological individuality redefined, 119, 120–1

- desire for originality, 116, 140  
 and Grant, 20, 50, 76  
 and Huxley, 133, 139–40, 141, 142  
 and London University, 150, 195n38  
*Nereis*, 96  
 and Newport, 81, 84  
 and Owen, 41, 50, 106, 116, 119, 120,  
 139–40, 194n22  
 on recapitulation, 46, 50, 76, 81, 83  
 on reflex arcs, neurophysiology and indi-  
 viduality, 49–50, 52, 59, 62–3, 156–7,  
 184n85  
 salps, 92, 149  
 sexual reproduction's distinctiveness, 118–  
 20  
 starfish, 77, 78  
 switch to palaetiology, 13, 116, 118–19,  
 165, 194n26  
 use of palaetiology, 9, 118, 123, 199n37  
 Carus, Carl Gustav, 69–70, 78, 81, 85  
 Carus, Julius Victor, 106, 107  
 cell theory, 27, 101, 199n46  
 cells *see under* elements  
 centipedes *see under* myriapods  
 centrifugal development, 3, 109, 115, 117,  
 140–1  
   resembling a tree, 113–14, 117, 118  
   *see also* epigenesis; von Baer, Karl Ernst  
 centripetal development, 3, 5, 8, 9, 65, 67–70,  
 135, 152, 162  
   *see also* epigenesis; metamorphosis; reca-  
   pitulation; Serres, Etienne  
 cephalization *see under* recapitulation  
 Charleton, Walter, 55  
 Clark, William, 31–2, 41, 45, 154  
 classification by nervous structure, 17, 18–  
 19, 67–8, 72–3, 74, 142, 162, 163–4,  
 172nn16–17  
 Clift, Caroline, 34, 40  
 Clift, William, 33–4, 35, 37–8, 40  
 Clift, William Home, 35, 176n73  
 collective action *see under* problematics of  
   analysis:synthesis  
 Combe, George, 59, 61  
 compound individuality *see under* problemat-  
   ics of analysis:synthesis  
 consentaneity, 5, 10  
 Conybeare, Daniel, 100  
 crustaceans, 72  
   crayfish, 71  
   *Daphnia*, 143–4, 148  
   lobsters, 72, 124, 186n21  
 crystals, 68, 98  
 Cuvier, Georges, 16–18, 31, 35, 56, 70, 115,  
 131  
   classification by nervous structure, 17, 74  
   and the Muséum, 30–1  
 Dallas, William Sweetland, 146  
 Dalyell, John, 91, 92, 97, 107, 123, 125,  
 195n43  
*Daphnia see under* crustaceans  
 Darwin, Charles Robert, 1, 92, 100, 107, 110,  
 123, 132, 134, 139, 163–4  
   compound individuality, 58, 96  
   and Newport, 53, 181n45  
   switching styles, 13, 165  
 Darwin, Erasmus, 95, 96, 190n26  
 Davey, James, 61  
 de Candolle, Alphonse, 95  
 de Condillac, Étienne Bonnot, 15–16, 24, 29  
 development *see* centrifugal development; cen-  
   tripetal development  
 Duges, Antoine, 92  
 Durkheim, Emile, 63, 184n89  
 echinoderms, 72  
   starfish, 45, 50, 71, 72, 74, 76–8, 79, 87,  
   92, 124, 187n36  
 education, 8, 19–21, 149–50, 156, 159,  
 186n26  
   examinations, 20, 73–4, 76, 150  
   student textbooks, 41, 45, 61, 68, 74, 76,  
   78, 80–1, 102, 142, 150, 156, 158  
 elements, 3, 10, 161, 176n64  
   as cells, 27, 101  
   delegation of properties to, 25–6, 62  
   as economic units, 24  
   as ganglia, 18–19, 43–4  
   as individual vertebral body segments,  
   100–1  
   as letters or sounds, 127  
   as pain and pleasure, 26  
   as phrenological mental faculties, 59  
   as reflex arcs, 44, 47, 79  
   as sensations, 24  
   as voters, 26–7

- Eliot, George (Mary Ann Evans), 151, 154, 193n7
- Elliotson, John, 49, 60–1
- embryology, embryo development *see* centrifugal development; centripetal development; epigenesis
- entozoa, 72, 148
- tapeworms, 71, 89–90, 100, 147
- epigenesis, contrast of centripetal and centrifugal, 65, 67, 69, 109
- ethnology, 118
- evidence, static or developing, 3–4, 121, 122–3, 127, 136, 138
- see also* museums; reproductive germs; aquaria
- evidentiary relevance, 2, 3–4, 6, 79, 109, 120, 121, 122, 130, 133, 134, 135, 138, 142, 145, 146, 147, 148, 200n50
- Faraday, Michael, 49, 134–5
- Farre, Arthur, 41, 122
- Flourens, Pierre, 57, 59, 183n73
- Flower, William Henry, 164, 203n2
- Forbes, Edward, 93, 104
- and Carpenter, 121, 194n26, 195n38
- and Huxley, 13, 132, 134, 139
- and museums, 31, 122, 125
- and Owen, 107–8, 141
- starfish, 87
- on 'vegetable characteristics' and compoundness, 97, 98, 103
- Fownes, George, 127
- Gall, Franz-Josef, 16, 18, 59, 61
- ganglia, 34, 43–4, 51, 156
- definition of, 17
- see also* elements
- generation, definitions of, 103
- Geoffroy Saint-Hilaire, Etienne, 16, 19, 31, 35, 85, 131
- Goethe, Johann Wolfgang, 93, 132, 152
- Goodsir, Harry, 97, 104, 191n30
- Goodsir, John, 27, 32, 41, 104, 115, 132
- Gosse, Philip Henry, 124, 125
- Grainger, Richard Dugard, 13, 18, 49, 50, 61, 173n28, 180n26
- neuroanatomy, 78–9
- see also* Theatre of Anatomy, Grainger's
- Grant, Robert Edmond, 6, 7, 10, 31, 70, 177n91
- and Darwin, 123
- envy of French researchers and institutions, 30–1, 32, 36, 38
- fears of plagiarism, 188n54
- and Hall, 13, 84
- Huxley's low opinion of, 132
- imitated Cuvier's classification by nervous structure, 18–19, 65, 74, 172n17, 186n23
- and Newport, 52, 76, 81, 84, 186n21
- and Owen, 33, 35, 40
- and his pupils, 20, 41, 50, 79, 84
- teaching style, 71–4, 75–6
- view of embryo's development as synthetic, 71–4, 78
- Great Exhibition of 1851, 108, 123
- Green, John Henry, 34, 55, 69
- Hall, Marshall, 13, 47–8, 49, 50, 55, 58, 61, 84, 173n28, 179n17, 180nn20–1, 183n68
- see also* reflex arc; Sydenham College
- Harvey, William, 69, 102, 122
- Henfrey, Arthur, 132, 141, 197n3
- Henslow, John Stevens, 95
- Herold, J. Moritz David, 71, 81, 84
- hierarchy, internal, 46–7, 48, 49, 51–2, 61–3, 157–8, 161–2, 179n19
- historical legitimation, 37–40, 146–7, 148, 163–4
- historiography, 6–7
- contextualism and history of science, 3, 165, 166
- diagrams, 11–13, 171n1
- interest-based explanations and changes in styles of reasoning, 128, 130, 138–9, 198n32
- professionalization as exclusion, 152, 202n83
- see also* intercontingency; possibilities, restriction of
- Holland, Henry, 60
- Home, Everard, 38
- homology *see* Owen, Richard
- Hooker, Joseph Dalton, 146, 150

- Hunter, John, 33, 35, 37–8, 39, 40, 55, 69, 71, 95, 102, 103, 146, 148, 177n3  
*see also* historical legitimation
- Hunterian Museum, 9, 35, 85, 108, 164, 177n88  
 origins of, 33–4  
 renovation of, 36, 38–9
- Huxley, Henrietta, 138, 141
- Huxley, Thomas Henry, 3, 6, 158, 198n33  
 biological individuality redefined, 8, 121, 133–6, 138, 155, 165–6  
 career ambitions frustrated, 128, 138–9, 141, 152  
 and Carpenter, 133, 139–40, 141  
 control of education, 8–9, 150, 156  
 drive to exclude ‘outsiders’, 9, 131, 150–4, 202n86  
 and Forbes, 13, 132, 134, 139, 141  
 on invisible ‘metaphysical’ entities, 146  
 and Owen, 8, 41, 116, 128, 130, 131–2, 133, 136, 138, 139, 142, 145–6, 163–4, 198n24, 199n47, 199n49, 200n50, 203n2  
 on parthenogenesis/metagenesis, 93, 128, 130, 131, 134, 135, 136, 138, 145–6, 149, 201n70  
 and reproductive masses, 143–5, 148  
 training in and use of palaeontology, 9, 125, 127, 133, 138, 147, 196n58  
*see also* education; professionalization of biology; terminology, invention and reception of new
- Hydra see under* zoophytes
- insects, 3, 17, 65  
 aphids, 91, 94, 101, 102, 103, 128, 133, 145, 155  
*Sphinx ligustri* (privet hawk-moth), 80–4  
 intercontingency, 165–7  
*see also* possibilities, restriction of
- interlocking belief systems, 1, 85, 109, 110–11, 115–16, 161–3
- Jardin des Plantes *see* Muséum d’Histoire Naturelle
- King’s College London, 31, 45, 76, 141
- Kingsley, Charles, 154
- Kölliker, Albert, 132, 197n4
- Lankester, Edwin Ray, 150
- Lawrence, William, 21, 31, 38, 39, 44, 92
- Lavoisier, Antoine Laurent, 15, 33
- Laycock, Thomas, 20, 79, 87
- levels of organization, 58, 108, 164, 184n84
- Lewes, George Henry, 164, 179n17  
 and Owen, 152, 155, 156  
 and parthenogenesis/metagenesis, 102, 107  
 and populist life science, 9, 131–2, 151–2, 154–9
- Lindley, John, 95, 106, 119
- Linnean Society of London, 91, 189n7
- Lloyd, William Alford, 124–5
- London University, 13, 20, 70, 76, 133, 144, 150, 195n38
- Lubbock, John, 125, 142–5, 148, 181n45
- Macleay, William Sharp, 106, 131, 132, 197n1
- Magendie, François, 43, 57
- Mantell, Gideon, 40
- Mayo, Herbert, 40, 45–6, 48, 50, 58, 60, 74, 76, 166
- Meckel, Johann Friedrich the Younger, 66, 70–1, 79, 84, 85  
 ‘Meckel-Serres Law’, 70  
 mentality, histories of *see* style of reasoning, definition of
- metamorphosis, 71, 76, 80, 88  
*see also* centripetal development; insects; recapitulation
- Middlesex Hospital, 44, 45, 50
- Mill, James, 24, 27, 29, 56, 174n43
- Mill, John Stuart, 23, 29, 57
- millipedes *see under* myriapods
- Milne Edwards, Henri, 35, 51, 55–8, 84, 92, 93, 106, 182n60, 183n64  
*see also* physiological division of labour
- Mivart, St George, 164
- monsters *see* teratology
- Müller, Johannes, 28, 41, 60, 84, 86, 92, 97, 101–2, 105, 106, 134
- Muséum d’Histoire Naturelle, 29–30, 40  
 and British visitors, 13, 18, 31, 35, 35–6, 131

- museums, 4, 9, 32, 36–7, 70, 122, 175nn53–4, 175n56  
*see also* Hunterian Museum; Muséum d'Histoire Naturelle
- myriapods, 62, 187n46  
 centipedes, 45, 50, 60, 62, 71  
*Iulus terrestris* (millipedes), 52–5, 80
- naturphilosophie*, 78, 93
- Newport, George, 6–7, 104, 132, 147, 180n20, 181n45, 188n53  
 on centripetal development, 65–6  
 cephalization of *Sphinx ligustri* (privet hawk-moth), 76, 80–4  
 and Grant, 20, 21, 76, 81, 84, 188n52  
 regeneration and reproduction, blurred distinction between, 91, 97  
 vivisections of *Iulus terrestris*/*Tachypodoiulus niger* (millipede), 52–5
- newts, 47–8, 50, 124, 157
- Oken, Lorenz, 93
- Ottley, Drewry, 39
- ova, ovum *see* reproductive germs
- Owen, Richard, 2, 6, 13, 47, 50, 57, 85, 91, 92, 93, 95, 104, 125, 132, 141, 142, 166–7, 177nn91–2, 188n52, 189n4  
 archetype, 100–1, 103, 191n37  
 and Carpenter, 41, 50, 116, 119–20, 140  
 cataloguing at Hunterian, 34, 35, 38, 39–40  
 Cuvier and Geoffroy, 35  
 domestication of analysis: synthesis, 11, 37–40  
 early years, 32–5  
 Hunterian Museum renovations, 36, 38–9  
 and Huxley, 116, 131, 139, 145, 146, 149, 199n47, 199n49  
 imitated Cuvier's classification by nervous structure, 18, 39–40, 65, 74, 163–4, 203nn1–2  
 and Lewes, 152, 155, 156  
 and Newport, 81, 147, 188nn52–3  
 nucleated yolk-cells ('primitive' cells), 101–2, 104, 107, 143–4, 145, 147  
 parthenogenesis and metagenesis, 5, 9, 10, 88, 101–7, 146–8, 149, 156, 192n64, 201n70  
 his pupils, 41, 164  
 reliance on static evidence, 122, 148  
 social ascent, 40–1, 108  
 spermatic force, 8, 101–2, 103, 105  
 teleological adaptive force, 28, 81, 97–9  
 terminological change from 'parthenogenesis' to 'metagenesis', 107  
 use of embryology, 115–6, 147–8, 201n67  
 use of recapitulation, 66, 69, 74, 79, 81  
 vegetative repetition, 8, 81, 97–8, 100, 101
- palaetiological reinterpretation of exemplar organisms, 2, 120  
 aphids, 133, 145  
 salps, 135–6  
 sertularian zoophytes, 133–4
- palaetiological reinterpretation of words, 2  
 'affinity', 127  
 'analysis', 112, 113  
 'elements', 127  
 'generation', 118–19, 136  
 'individual', 120–1  
 'phytoid', 133
- palaetiology, 3, 8, 9, 109, 113  
 Whewell's definition of, 110–11, 193n1  
*see also* von Baer, Karl Ernst
- parallelism *see under* recapitulation
- parthenogenesis *see under* Owen, Richard
- Peel, Robert, 40, 108
- philology, comparative, 8, 110, 118, 127  
 linguistic development as tree-like, 118
- phrenology, 9, 13, 16, 49, 59, 61, 79, 173n28, 180n26, 183n74
- physiological division of labour, 55–8, 161  
*see also* Milne Edwards, Henri
- plagiarism, 49, 76, 81, 84, 188n52, 188n54
- polygastric infusoria, 73, 154, 186n23
- polyp: plant resemblance, 71, 91, 92–3, 95–7, 103–4, 121, 148, 165  
 criticism of resemblance, 118–20, 136, 138  
 'vegetative' power of reproduction, 92, 93, 97, 116  
*see also* Owen, Richard
- populist life science, 150–1, 154–5, 156–7, 158–9

- possibilities, restriction of, 132, 149, 164, 165–6
- presuppositions *see* evidentiary relevance
- Prichard, James Cowles, 110, 118
- problematics of analysis:synthesis, 5, 113, 164
- collective action, 5, 43, 51–2, 59, 61–3, 157
  - compound individuality, 5, 8, 18, 45–6, 74, 86, 89, 93, 96, 128, 149, 155, 156
  - spontaneous order, 5, 27–9, 60, 98–9, 157–8
- problematics of palaeiology, 113, 164
- professionalization of biology, 10, 131–2, 139, 150, 158–9
- see also* Huxley, Thomas Henry
- Quain, Jones, 21, 68
- radicalism, political and philosophic, and ties with philosophic anatomy, 9, 10, 22–5, 27–8, 60
- not always materialist, 22, 173n28, 183n68
  - uses of analysis:synthesis, 25–7
- Réaumur, René Antoine, 91
- recapitulation, 5, 99
- animal internal organ equivalences, 46–7, 162
  - cephalization, 66, 72–4, 78, 80, 162–3
  - distinction between two kinds of parallelism, 66–7, 71–4
  - fusion of developing parts ('Williston's Law' or 'anchylosis'), 9, 66–7, 69, 79, 80
  - reverse recapitulation, 47, 48
- reflex arc, 9, 52, 62, 156, 157, 183n68
- independence from volition, 48, 49, 79, 179n17
  - as neurophysiological element, 47
- regeneration and reproduction, blurred distinction between, 92, 97, 98, 148, 155, 192n48
- distinction between 'gemmiparous' and 'oviparous' reproduction, 119–20
  - reproduction and regeneration likened to nutrition, 102, 104
  - see also* polyp:plant resemblance
- Reid, John, 107, 123
- reproductive germs, 94, 95–7, 98
- Carpenter emphasizes ovum, 119–20
  - historically indistinguishable from one another, 4, 121, 134, 143, 144, 145, 147, 148
  - Lubbock's work on, 142–5
  - palaeiologists' emphasis on sexual fertilization, 121, 134, 143, 145, 148
- Rogee, Peter Mark, 20, 48, 57, 80, 84, 89, 92, 95, 174n33, 183n64, 188n54
- Royal College of Surgeons, 9, 33, 36, 45, 69, 108
- Royal Society of London, 48, 84, 118, 194n24
- Rymer Jones, Thomas, 80–1, 91, 92, 125
- classification by nervous structure, 19, 142
  - Huxley on, 132, 135
  - and Owen, 41, 106
  - use of cephalization, 74
- St Bartholomew's Hospital, 33, 40, 41
- salps *see under* tunicates
- scale of being, 17–50, 68
- Schleiden, Matthias, 27, 127, 142
- scientific inferiority
- relative to France, 30–1, 32, 36, 38–9
  - relative to Germany, 115, 127, 132, 138, 141
- sea anemones (actinia), 92, 123, 155, 195n43
- sea squirts *see under* tunicates
- Sedgwick, Adam, 40, 99
- self-authentication, self-vindication *see* interlocking belief systems
- sensorium commune*, 43, 47, 79, 156
- downgrading its importance, 18, 44–5, 58–9, 62
- serial homology, 10, 88, 98, 100–1, 161, 164
- see also* Owen, Richard
- Serres, Etienne, 66–7, 68, 69, 79, 85, 115
- sex, sexual reproduction *see* regeneration and reproduction, blurred distinction between
- Smith, Sidney, 60, 61–2
- Smith, Thomas Southwood, 20, 24–5, 49, 67–8, 76

- societies, claimed resemblance of bodies to, 10, 27, 43, 51–2, 58–9, 60, 62–3, 98–9, 157  
 the bodily oeconomy, 55–8
- Solly, Samuel, 13, 19, 20, 40, 76, 79, 80
- Spallanzani, Lazzaro, 91
- Spencer, Herbert, 57, 58, 63, 105, 164, 203n4
- spermatorrhoea, 105
- spontaneous order *see under* problematics of analysis:synthesis
- starfish *see under* echinoderms
- Steenstrup, Johan Japetus, 93, 103, 107, 118, 119, 134, 135, 142, 190n16
- Stewart, Leonard, 27–8
- Stuchbury, Samuel, 35
- style of reasoning, definition of, 1–2, 3, 169nn1–2  
*see also* analysis:synthesis; palaeiology
- Swainson, William, 32
- Swan, Joseph, 84
- Sydenham College, 32
- tapeworms *see under* entozoa
- teleological adaptive force *see under* Owen, Richard
- teratology, 5, 65, 85–6, 162
- terminology, invention and reception of new, 8, 149, 156–9  
 ‘ascidium’, 150  
 ‘ascidiozooids’, 150  
 ‘endoplast’, 149  
*Lyencephala*, *Lissancephala*, *Gryencephala*, *Archencephala*, 163–4  
 ‘metagenesis’, 107  
 ‘parthenogenesis’, 102  
 ‘periplast’, 149  
 ‘polypite’, 149  
 ‘pseudova’, 145, 149, 155  
 ‘zoöid’, 133, 134, 144, 146, 149, 165
- testimonials, 13, 33, 41, 116, 131, 133, 141, 188n53, 195n38
- Theatre of Anatomy, Bell’s, 44, 45, 178n3
- Theatre of Anatomy, Grainger’s, 25, 32, 44, 49, 178n3
- Thomson, Allen, 89, 92, 95, 101, 107, 121, 134, 198n17
- Tiedemann, Friedrich, 69, 76, 79, 81, 111
- Todd, Robert Bentley, 40, 46–7, 61, 63
- Trembley, Abraham, 57, 91, 122
- Tugwell, George, 155
- tunicates, 72, 95  
 salps, 91, 92–3, 95, 135–6, 137, 147, 149  
 sea squirts, 56, 86, 93, 95, 116, 124, 150, 151, 194n22
- University College London, University of London *see* London University
- University of Edinburgh, 13, 19, 31, 32, 33, 40, 44, 47, 50, 141, 158
- vegetative repetition *see under* Owen, Richard
- vivaria *see* aquaria
- vivisection, 5, 17–18, 44, 47, 50–1, 154, 157, 161  
 of millipedes, 52–5
- von Baer, Karl Ernst, 189n4  
 development as sequence of divergences, 112–13  
 embryological principles, 3, 8, 111–12, 115, 152, 193n10  
 mocked classification by nervous structure, 111  
 ‘upstream’ changes the most important, 113  
*see also* centrifugal development
- von Chamisso, Adelbert, 93
- von Haller, Albrecht, 69
- von Siebold, Karl Theodor Ernst, 142, 145, 146, 200n62
- Ward, Nathaniel, 123–4
- Watson, Hewett Cottrell, 61
- Weismann, August, 149
- Westwood, John Obidiah, 41
- Wharton Jones, Thomas, 13, 134
- Whewell, William, 3, 8, 40, 99, 109, 110
- Whig history *see* historical legitimation
- Wigan, Arthur Ladbrooke, 60–1
- zoöid *see under* terminology, invention and reception of new
- Zoological Society of London, 31, 36–7, 125, 196n52
- zoophytes, 71, 86, 95, 121, 122, 123, 173n20  
*Hydra* polyp, 6, 56, 91, 92, 94–5, 103, 119, 120, 124, 128, 135, 192n56  
 sertularian polyp, 86, 95, 97, 120, 133

copyright material