**Table 13.1.** *Semnopithecus entellus* field studies. The table is representative but not exhaustive; for example, conservation-related projects and broad zoological surveys are generally not included. *Habitat* descriptions follow the wording of authors. *Primary foci* are those general research areas that predominate quantitative data collection at the site; for all but long-term (Jodhpur and Ramnagar) and large-team (Polonnaruwa) sites this is arbitrarily capped at a maximum of three foci. D = diet, A = activity patterns, R = ranging, P = predation, S = social organization, X = individual sexual and social behavior, Other = topical, usually theory-driven, research areas. *Refs* are selected references.

| **Researcher(s)** | **Study site** | **Habitat** | **Years** | **Primary foci** | | | | | | | **Refs** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **D** | **A** | **R** | **P** | **S** | **X** | **Other** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Ishwar Prakash  Mathur Reena  Manohar B. Ram | Jaipur, India | arid scrub,  dry forest, village | 1956-1960 1985-1987 |  |  |  |  | 🗸 | 🗸 |  | 1 |
| Phyllis Jay | Orcha, India | forest | 1958-1959 |  |  |  |  | 🗸 | 🗸 |  | 2 |
| Phyllis Jay | Kaukori, India | village,  cultivated land | 1959-1960 |  |  |  |  | 🗸 | 🗸 |  | 2 |
| Yukimaru Sugiyama  Kenji Yoshiba  M.D. Pathasarathy | Dharwar, India | dry deciduous forest,  scrub | 1961-1963 |  |  | 🗸 |  |  | 🗸 | infanticide | 3 |
| Yukimaru Sugiyama | Raipur, India | dry scrub | 1962 |  |  |  |  | 🗸 |  |  | 4 |
| Suzanne Ripley  Nancy Muckenhirn Theodore I. Grand  C.M. Hladik | Polonnaruwa, Sri Lanka | dry forest,  archeological reserve | 1962-1963 1968-1972 | 🗸 |  | 🗸 | 🗸 |  |  | locomotion and posture | 5 |
| Nancy Muckenhirn Benjamin Beck  Russell Tuttle | Wilpattu National Park, Sri Lanka | dry forest | 1968-1970 |  | 🗸 |  | 🗸 |  |  |  | 6 |
| Surendra Mohnot  Arun Srivastava Volker Sommer et al. | Jodhpur, India | open scrub,  cultivated land, village | 1967-present | 🗸 |  |  |  | 🗸 | 🗸 | infanticide | 7 |
| Christian Vogel | Bhimtal, India | upper monsoon forest | 1968 |  |  |  |  | 🗸 | 🗸 | auditory communication | 8 |
| Christian Vogel | Sariska, India | dry forest | 1968 |  |  |  |  | 🗸 | 🗸 | auditory communication | 8 |
| Hafeezur Rahaman  Erica Starin | Gir Sanctuary, India | dry deciduous forest | 1971 | 🗸 | 🗸 | 🗸 |  |  |  |  | 9 |
| Sarah Hrdy | Mount Abu, India | village | 1971-1973 |  |  |  |  | 🗸 | 🗸 | infanticide | 10 |
| Naomi H. Bishop  John M. Bishop | Melemchi, Nepal | Himalayan | 1971-1972 |  |  |  |  | 🗸 | 🗸 | auditory communication | 11 |
| John Oppenheimer | Singur, India | village | 1971-1972 | 🗸 |  |  |  | 🗸 |  | human interaction | 12 |
| Jane Boggess  Richard A. Curtin | Junbesi, Nepal | Himalayan | 1972-1978 |  |  | 🗸 |  | 🗸 | 🗸 |  | 13 |
| Yukimaru Sugiyama | Simla Region, India | Himalayan | 1972-1973 | 🗸 |  | 🗸 |  | 🗸 |  |  | 14 |
| P.L. Kankane  Paul N. Newton | Kanha Tiger Reserve, India | moist deciduous forest, meadow | 1977  1980-1982 | 🗸 |  | 🗸 |  | 🗸 |  |  | 15 |
| P.L. Kankane | Shivpuri, India | dry deciduous forest | 1978 | 🗸 |  |  |  | 🗸 |  |  | 16 |
| John W. Laws  Julia V.H. Laws  K. Kar-Gupta  Ajith Kumar | Rajaji Wildlife Santuary, India | mixed deciduous  subtropical forest | 1978 | 🗸 |  |  |  | 🗸 | 🗸 |  | 17 |
| M.A.R. Khan  M.M. Alam  M.M. Rahman et al. | Jessore District, Bangladesh | open woodland,  open plains,  cultivated land, village | 1981-1984 2012-2013 | 🗸 | 🗸 |  |  |  | 🗸 |  | 18 |
| Andreas Koenig  Carola Borries  Paul Winkler  Christian Vogel  Mukesh Chalise et al. | Ramnagar, Nepal | Sal forest | 1990-1997 | 🗸 | 🗸 | 🗸 |  | 🗸 | 🗸 | socioecological model; handedness | 19 |
| Gottfried Hohmann  Caroline Ross | Mundanthurai Wildlife Sanctuary, India | scrub,  dry deciduous forest,  riverine forest | 1985-1987 1991 |  |  |  |  |  |  | auditory communication, infanticide | 20 |
| Mewa Singh et al. | Anaimalai Hills, India | tropical evergreen forest | 1994-1997 |  |  | 🗸 |  |  |  | niche partitioning | 21 |
| Shaligram Adhikaree  Tej Kumar Shrestha | Charkose, Nepal | forest | 1995-1996 | 🗸 |  |  |  |  |  |  | 22 |
| Anil K. Chhangani  Surendra M. Mohnot | Kumbhalgarh Wildlife Sanctuary, India | dry deciduous forest | 1996 | 🗸 |  | 🗸 |  | 🗸 |  |  | 23 |
| Riyas Ahamed  M. Dharmaretnam | Eastern University, Sri Lanka | College campus, forest, agricultural land | 1998+ | 🗸 | 🗸 |  |  |  |  | handedness | 24 |
| Ken Sayers et al. | Langtang National Park, Nepal | Himalayan | 2000  2002-2004 | 🗸 | 🗸 |  |  |  |  | optimal foraging theory | 25 |
| Mewa Singh et al. | Western Ghats, India (various) | various | 2001-2014 | 🗸 |  |  |  | 🗸 |  | niche partitioning | 26 |
| Martina Konečná  Milada Petrů et al. | Bhangarh-Naranimata, India | dry deciduous forest,  open shrub | 2002-2004 |  |  |  |  |  | 🗸 | temperament, socialization | 27 |
| Riaz Aziz Minhas et al. | Machiara National Park, Pakistan | Himalayan | 2006-2007 | 🗸 |  | 🗸 |  | 🗸 |  |  | 28 |
| Rajnish Vandercone et al. | Kaludiyapokuna Forest Reserve, Sri Lanka | dry forest | 2006-2009 | 🗸 |  |  |  |  |  | movement ecology | 29 |
| Divya Vasudev et al. | Bandipur National Park Region, India | scrub, tropical dry and  moist deciduous forest | 2006 |  |  |  |  | 🗸 |  |  | 30 |
| Aniruddha Majumder et al. | Pench Tiger Reserve, India | tropical dry and  deciduous moist forest | 2009-2010 | 🗸 |  |  |  |  |  |  | 31 |

Review references: Srivastava and Dunbar 1996; Kirkpatrick 1999; Koenig and Borries 2001; Kirkpatrick 2007; Sterck 2012

Specific references: 1. Prakash 1962, Reena and Ram 1992; 2. Jay 1962, 1963, 1965; 3. Sugiyama et al. 1965, Sugiyama 1966; 4. Sugiyama 1964, 1976; 5. Ripley 1967a, 1967b, Muckenhirn 1973, Grand 1976, Hladik 1977; 6. Beck and Tuttle 1972, Muckenhirn 1973; 7. Mohnot 1971a, 1971b, Sommer and Mohnot 1985, Srivastava 1991a, 1991b, 1992, Sommer and Rajpurohit 1989, Rajpurohit et al. 2003, Meena et al. 2015; 8. Vogel 1970, 1973; 9. Rahaman 1973, Starin 1978; 10. Hrdy 1974; 11. Bishop and Bishop 1975, Bishop 1979; 12. Oppenheimer 1976; 13. Boggess 1980, Curtin 1982; 14. Sugiyama 1976; 15. Newton 1987, 1992, Kankane 1988; 16. Kankane 1984; 17. Laws and Laws 1984, Kar-Gupta and Kumar 1994; 18. Khan 1984, Alam et al. 2014, Rahman et al. 2015; 19. Chalise 1995, Mittra et al. 1997, Koenig et al. 1998, Koenig and Borries 2001; 20. Hohmann 1989a, Ross 1993; 21. Singh et al. 1997; 22. Adhikaree and Shrestha 2011; 23. Chhangani 2002, Chhangani and Mohnot 2006; 24. Ahamed and Dharmaretnam 2003, 2015; 25. Sayers and Norconk 2008, Sayers et al. 2010; 26. Singh et al. 2011, 2016; 27. Konečná et al. 2008, Petrů et al. 2008; 28. Minhas et al. 2010a, 2010b, Minhas et al. 2013; 29. Vandercone et al. 2012, 2013; 30. Vasudev et al. 2008; 31. Majumder et al. 2011

**Table 13.2.** *Semnopithecus johnii* field studies. Notation and description as in Figure 1.

| **Researcher(s)** | **Study site** | **Habitat** | **Years** | **Primary foci** | | | | | | | **Refs** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **D** | **A** | **R** | **P** | **S** | **X** | **Other** |  |
| Frank E. Poirier | Nilgiri District, India | forest and shrub patches (shola) | 1965-1966 |  |  |  |  |  |  | communication | 1 |
| Robert H. Horwich K.K. Srivastava  Jiro Tanaka et al. | Periyar Sanctuary, India | tropical evergreen and deciduous forest | 1968, 1974 1992-1993 |  |  |  |  |  |  |  | 2 |
| John F. Oates et al. | Kakachi, India | evergreen high forest | 1975-1976 |  |  |  |  |  |  | nutritional chemistry | 3 |
| J.M. Johnson Gottfried Hohmann  S.F. Wesley Sunderraj  A.J.T. Johnsingh | Mundanthurai Wildlife Sanctuary, India | shola | 1977-1979 1985-1988 |  |  |  |  |  |  | auditory communication | 4 |
| J.M. Johnson | Kalakad Sanctuary, India | shola | 1979-1981 |  |  |  |  |  |  |  | 5 |
| K.K. Ramachandran Gigi K. Joseph | Silent Valley National Park, India | evergreen forest | 1993-1996 |  |  |  |  |  |  |  | 6 |
| M.R. Singh et al.  Sunil Tiwari et al. | Anaimalai Hills, India | tropical evergreen forest | 1994-1996 2014-2015 |  |  |  |  |  |  | niche partitioning, parasitology | 7 |
| Mewa Singh et al. | Western Ghats, India (various) | various | 2001-2014 |  |  |  |  |  |  |  | 8 |
| K.A. Sujana et al. | Wayanad, India | forests, shola | 2008-2011 |  |  |  |  |  |  |  | 9 |
| Theethira S. Kavana et al. | Naduvattam, India | shola | 2010 |  |  |  |  |  |  |  | 10 |
| Theethira S. Kavana et al. | Nelliyampathy Reserve Forest, India | tropical moist deciduous forest | 2010-2013 |  |  |  |  |  |  | infanticide | 11 |
| Debahutee Roy et al. | Parambikulam Tiger Reserve | tropical evergreen and deciduous forest | 2011-2012 |  |  |  |  |  |  |  | 12 |

Review references: Roonwal and Mohnot 1977; Kirkpatrick 1999, 2007; Sterck 2012

Specific references: 1. Poirier 1970a, 1970b; 2. Tanaka 1965; Horwich 1972, 1976, 1980; Srivastava 1996; 3. Oates et al. 1980; 4. Johnson 1984; Hohmann 1989a, 1989b; Sunderraj and Johnsingh 2001; 5. Johnson 1984; 6. Ramachandran and Joseph 2001; Joseph and Ramachandran 2003; 7. Singh et al. 2000; Tiwari et al. 2017; 8. Singh et al. 2016; 9. Sujana et al. 2012; 10. Kavana et al. 2015a; 11. Kavana et al. 2014; 12. Roy 2012; Roy et al. 2012

**Table 13.3.** *Semnopithecus vetulus* field studies. Notation and description as in Figure 1.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Researcher(s)** | **Study site** | **Habitat** | **Years** | **Primary foci** | | | | | | | **Refs** |
|  |  |  |  | **D** | **A** | **R** | **P** | **S** | **X** | **Other** |  |
| Rasanayagam Rudram  G.H. Manley | Horton Plains, Sri Lanka | tropical cloud forest | 1968-1970 |  |  |  |  |  |  |  | 1 |
| Rasanayagam Rudram  G.H. Manley Suzanne Ripley Theodore I. Grand C.M. Hladik et al. | Polonnaruwa, Sri Lanka | dry forest, archeological reserve | 1968-1970 1989 |  |  |  |  |  |  | nutritional chemistry; locomotion and posture; auditory communication | 2 |
| Jinie D.S. Dela | Panadura, Sri Lanka | home gardens, cultivated land | 1984-1992 |  |  |  |  |  |  |  | 3 |
| Jinie D.S. Dela | Piliyandala, Sri Lanka | home gardens, cultivated land | 1984-1992 |  |  |  |  |  |  |  | 3 |
| C. Eschmann  R.S. Moore  K.A.I. Nekaris | Talangama Wetlands, Sri Lanka | home gardens, plantation | 2006-2008 |  |  |  |  |  |  | auditory communication | 4 |
| Rajnish Vandercone et al. | Kaludiyapokuna Forest Reserve, Sri Lanka | dry forest | 2006-2009 |  |  |  |  |  |  | movement ecology | 5 |
| Rasanayagam Rudram et al. | Waga, Sri Lanka | dense canopy forest | 2009-2010 |  |  |  |  |  |  |  | 6 |

Review references: Roonwal and Mohnot 1977; Kirkpatrick 1999, 2007; Sterck 2012

Specific references: 1. Rudran 1973a, Manley, in Roonwal and Mohnot 1977 pp. 305-308; 2. Ripley 1967b, Amerasinghe et al. 1971, Rudran 1973a, 1973b, Grand 1976, Hladik 1977, Manley, in Roonwal and Mohnot 1977 pp. 305-308, Hohmann 1990; 3. Dela 2007; 4. Eschmann et al. 2008, Moore et al. 2010; 5. Vandercone et al. 2012, 2013; 6. Rudran et al. 2013

**Table 13.4.** Dietary composition of *Semnopithecus* as estimated by % feeding records or % weight in extended (≥6 mo) field studies. Note that differences in methodology may render strict cross-study comparisons problematic. Listed within species by approximate order of increasing latitude. L = all leaves, ML = mature leaves, YL = young leaves, LB = leaf buds, FR = fruits and seeds, FL = flowers, Other = predominate resources with other categorizations, USOs = underground storage organs, broadly construed, including tubers, roots, and rhizomes. Note that percentages are only given where quantified; blanks cells do not necessarily indicate that the part was not eaten. Data from multiple groups and/or multiple studies at the same site are averaged.

| **Species** | **Site** | **Habitat** | **L** | **ML** | **YL** | **LB** | **FR** | **FL** | **Other** | **Refs** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Semnopithecus entellus* | Polonnaruwa, Sri Lanka | dry forest, archeological reserve | 48 | 21 | 27 |  | 45 | 7 | Earth, insects | 1 |
| *Semnopithecus entellus* | Kaludiyapokuna Forest Reserve, Sri Lanka | dry forest | 55 | 5 | 50 |  | 26 | 19 | Sap, soil | 2 |
| *Semnopithecus entellus* | Dharwar, India | dry deciduous forest and scrub | >54 |  |  |  | >6 | 13 | Soft stalks, bark, insects | 3 |
| *Semnopithecus entellus* | Kanha Tiger Reserve, India | moist deciduous forest, meadow | 49 | 35 | 4 | 11 | 24 | 10 | Insects, gum | 4 |
| *Semnopithecus entellus* | Jessore District, Bangladesh | open woodland, open plains, cultivated land, village | 50 |  |  |  | 37 | 3 | Bark, provisioned foods | 5 |
| *Semnopithecus entellus* | Singur, India | village | 54 |  |  |  | 37 | 5 | Provisioned foods | 6 |
| *Semnopithecus entellus* | Jodhpur, India | open scrub, cultivated land, village | 67 | 39 | 28 |  | 23 | 7 | Provisioned foods | 7 |
| *Semnopithecus entellus* | Ramnagar, Nepal | Sal forest | 58 | 47 | 14 |  | 20 | 8 | Insects | 8 |
| *Semnopithecus entellus* | Charkose, Nepal | forest | <44 |  |  |  | 56 |  | Bark, resin | 9 |
| *Semnopithecus entellus* | Junbesi, Nepal | Himalayan | >45 | >31 | >14 |  | >1 |  | Crops, USOs, bark | 10 |
| *Semnopithecus entellus* | Langtang National Park, Nepal | Himalayan | 57 | 25 | 12 | 19 | 22 | 7 | USOs including crops, bark | 11 |
| *Semnopithecus entellus* | Machiara National Park, Pakistan | Himalayan | 63 | 36 | 27 |  | 17 | 2 | USOs, bark, stems | 12 |
|  |  |  |  |  |  |  |  |  |  |  |
| *Semnopithecus johnii* | Anaimalai Hills, India | tropical evergreen forest | 57 |  |  |  | 19 |  |  | 13 |
| *Semnopithecus johnii* | Silent Valley National Park, India | evergreen forest | 62 |  |  |  | 28 | 10 | Bark, twigs, insects | 14 |
| *Semnopithecus johnii* | Kakachi, India | evergreen high forest | ≤62 | ≥27 | ≥26 | ≤6 | ≥25 | ≥9 | Stems, bark | 15 |
| *Semnopithecus johnii* | Naduvattam, India | shola | >57 |  |  |  |  |  |  | 16 |
|  |  |  |  |  |  |  |  |  |  |  |
| *Semnopithecus vetulus* | Panadura, Sri Lanka | home gardens, cultivated land | 32 | ≥8 | ≥22 |  | 52 | 8 | Stems, exudates | 17 |
| *Semnopithecus vetulus* | Piliyandala, Sri Lanka | home gardens, cultivated land | 29 | ≥4 | ≥17 |  | 54 | 4 | Stems, exudates | 17 |
| *Semnopithecus vetulus* | Waga, Sri Lanka | dense canopy forest | 82 |  |  |  | 6 | 7 |  | 18 |
| *Semnopithecus vetulus* | Kaludiyapokuna Forest Reserve, Sri Lanka | dry forest | 63 | 5 | 58 |  | 26 | 11 |  | 2 |
| *Semnopithecus vetulus* | Polonnaruwa, Sri Lanka | dry forest, archeological reserve | 60 | ~40 | ~20 |  | 28 |  |  | 1 |

Review references: Kirkpatrick 1999, 2007; Sayers and Norconk 2008; Sterck 2012

Specific references: 1. Hladik 1977; 2. Vandercone et al. 2012; 3. Yoshiba 1967; 4. Newton 1992; 5. Khatun et al. 2011, Rahman et al. 2015; 6. Oppenheimer 1978; 7. Srivastava 1989, cited in Newton 1992; 8. Averaged from Koenig and Borries 2001; 9. Adhikaree and Shrestha 2011; 10. Curtin 1975; 11. Sayers and Norconk 2008; 12. Minhas et al. 2010a; 13. Singh et al. 2000; 14. Ramachandran and Joseph 2001; 15. Oates et al. 1980; 16. Kavana et al. 2015a; 17. Dela 2007; 18. Rudran et al. 2013

**Table 13.5.** Percentages of diurnal activity for *Semnopithecus* behaviors in extended (≥6 mo) field studies. Note that differences in methodology may render strict cross-study comparisons problematic. Single troop unless noted differently. Social includes grooming if not indicated separately, and also includes play behavior. Other = other quantified activities. Blank cells are unquantified.

| **Species** | **Site** | **Habitat** | **Feed** | **Rest** | **Travel** | **Groom** | **Social** | **Other** | **Notes** | **Refs** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Semnopithecus entellus* | Kaludiyapokuna Forest Reserve, Sri Lanka | dry forest | 27 |  |  |  |  |  | Two troops | 1 |
| *Semnopithecus entellus* | Dharwar,  India | dry deciduous forest and scrub | 44 | 33 | 6 |  | 7 | 9 | Based on 10 day-long focal samples; mixed age-sex classes | 2 |
| *Semnopithecus entellus* | Kanha Tiger Reserve, India | moist deciduous forest, meadow | 26 | 42 | 13 | 6 |  | 8 | All age-sex classes | 3 |
| *Semnopithecus entellus* | Jessore District, Bangladesh | open woodland, open plains, cultivated land, village | 39 | 52 | 5 |  |  |  | Two troops | 4 |
| *Semnopithecus entellus* | Singur, India | village | 29 |  |  |  |  |  | Two troops. Author not Manhattan Project physicist | 5 |
| *Semnopithecus entellus* | Jodhpur, India | open scrub, cultivated land, village | 24 |  |  | 9 |  |  | Feeding: all age-sex classes; Grooming: adult females | 6 |
| *Semnopithecus entellus* | Ramnagar, Nepal | Sal forest | 34 |  |  |  |  |  | Average from 3 troops | 7 |
| *Semnopithecus entellus* | Junbesi, Nepal | Himalayan | 39 |  |  |  |  |  | All age-sex classes | 8 |
| *Semnopithecus entellus* | Langtang National Park, Nepal | Himalayan | 40 | 29 | 18 | 10 | 1 | 3 | Adult | 9 |
| *Semnopithecus entellus* | Machiara National Park, Pakistan | Himalayan | 32 | 21 | 12 | 10 |  | 23 | Three focal groups; all age-sex classes | 10 |
|  |  |  |  |  |  |  |  |  |  |  |
| *Semnopithecus johnii* | Anaimalai Hills, India | tropical evergreen forest | 33 | 34 | 22 |  | 6 | 5 | All age-sex classes | 11 |
| *Semnopithecus johnii* | Kakachi, India | evergreen high forest | 35 |  |  |  |  |  | All age-sex classes | 12 |
|  |  |  |  |  |  |  |  |  |  |  |
| *Semnopithecus vetulus* | Kaludiyapokuna Forest Reserve, Sri Lanka | dry forest | 14 |  |  |  |  |  | All age-sex classes | 1 |

Specific references: 1. Vandercone et al. 2012; 2. Yoshiba 1967; 3. Newton 1992; 4. Khatun et al. 2011; 5. Oppenheimer 1978; 6. Winkler 1988, Srivastava 1989, cited in Borries et al. 1994; 7. Koenig and Borries 2001; 8. Curtin 1982 Table III; 9. Sayers and Norconk 2008; 10. Minhas et al. 2010; 11. Singh et al. 2000; 12. Oates et al. 1980

**Table 13.6.** Ranging in *Semnopithecus* as quantified in extended field studies. Note that differences in methodology may render strict cross-study comparisons problematic. Data for each category from individual troop within study area; across categories (e.g., density vs range) not always identical troop. Troops with all age-sex classes unless specified otherwise.

| **Species** | **Site** | **Habitat** | **Density (ind/km2)** | **Overlap** | **Range (ha)** | **Daily path length (m)** | **Refs** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Semnopithecus entellus* | Kaludiyapokuna Forest Reserve, Sri Lanka | dry forest |  | *S. entellus;*  *S. vetulus;*  *M. sinica* | 9 and 8  (two troops) | 441 and 348 (two troops) | 1 |
| *Semnopithecus entellus* | Gerusoppa Forest Range, India | tropical evergreen forest |  | *S. entellus*;  *M. radiata*;  *M. silenus* | 12 |  | 2 |
| *Semnopithecus entellus* | Dharwar, India | forest | 85 | *S. entellus*; *Macaca mulatta*; *M. radiata* | bisexual: 19  all male: 1662 |  | 3 |
| *Semnopithecus entellus* | Dharwar, India | open scrub | 17 | *S. entellus; Macaca mulatta; M. radiata* | bisexual: 150  all male: 1662 |  | 3 |
| *Semnopithecus entellus* | Orcha, India | forest | 3-6 | *S*. *entellus*; *Macaca mulatta* | ~388 |  | 4 |
| *Semnopithecus entellus* | Kanha Tiger Reserve, India | moist deciduous forest, meadow | 46 | *S. entellus* | 75 | 1083 | 5 |
| *Semnopithecus entellus* | Kaukori, India | village, cultivated land | 3 | *Macaca mulatta* | ~777 |  | 4 |
| *Semnopithecus entellus* | Ramnagar, Nepal | Sal forest | 26 | *S. entellus*; *Macaca mulatta* | 163 |  | 6 |
| *Semnopithecus entellus* | Junbesi, Nepal | Himalayan | 2 | *S. entellus*; *Macaca* sp. | 1269 | 1179a | 7 |
| *Semnopithecus entellus* | Langtang National Park, Nepal | Himalayan | extremely low | minimal with *S*. *entellus* |  | 1497 | 8 |
| *Semnopithecus entellus* | Machiara National Park, Pakistan | Himalayan | 16 | *S. entellus* | large bisexual: 328  small bisexual: 235  all male: 352 | lb: 1750  sb: 1230  am: 1840 | 9 |
|  |  |  |  |  |  |  |  |
| *Semnopithecus johnii* | Kakachi, India | evergreen high forest | ≥67 | *S. johnii*;  *M*. *silenus* | 24 |  | 10 |
| *Semnopithecus johnii* | Nilgiri District, India | shola |  | *S. johnii*;  *S. entellus*;  *M. radiata;*  *M. silenus* | ~65 to ~259 |  | 11 |
|  |  |  |  |  |  |  |  |
| *Semnopithecus vetulus* | Kaludiyapokuna Forest Reserve, Sri Lanka | dry forest |  | *Semnopithecus entellus*; *Macaca sinica* | 11 | 251 | 1 |

a. Mean of four three-month averages from Jan to Dec 1972

Review reference: Kirkpatrick 2007. Specific references: 1. Vandercone et al. 2012, 2013; 2. Singh et al. 2011; 3. Sugiyama 1964, Yoshiba 1968; 4. Dolhinow 1972; 5. Newton 1987, 1992; 6. Podzuweit 1994, cited in Chalise 1995, Chalise 1995, Borries et al. 2001; 7. Curtin 1975 pp. 52, 61, 120, Curtin 1982; 8. Sayers and Norconk 2008; 9. Minhas et al. 2010b, 2013, density calculated from Minhas et al. 2010b p. 146; 10. Oates et al. 1980; 11. Poirier 1970

**Table 13.7.** Predation on *Semnopithecus*. Note that differences in methodology may render strict cross-study comparisons problematic. Asterisk (\*) denotes observed attacks, forensic evidence of attack, or langur remains found in scat. “Predators” without asterisk have been implicated as potential predators at sites for the species and region in question. Parasites include all quantified non-zero prevalence results from database accessible through Nunn and Altizer (2005) with additional information from Trapido et al. (1964), Dewit et al. (1991), Rajendran et al. (2004), Holbrook 2012, and Kumar et al. (2018). Ectoparasites and biting flies are assumed to have at least seasonal impact across all species and regions.

| **Species** | **Region** | **Predators**  **(classical sense)** | **Parasites** | **Notes** | **Refs** |
| --- | --- | --- | --- | --- | --- |
| *Semnopithecus entellus* | Sri Lanka | *Canis lupus familiaris*\*  *Panthera pardus*\*  *Corvus macrohynchos*  *Nisaetus cirrhatus*\*  *Crocodylus palustris*  *Python molurus* | *Esherichia coli*  *Cryptosporidium* sp.  *Entamoeba histolytica*  *Enterobius* sp.  *Oesophagostomum aculeatum*  *Trichuris* sp.  Ectoparasites  Biting flies |  | 1 |
| *Semnopithecus entellus* | Subcontinent,  non-Himalayan | *Canis aureus*\*  *Canis lupus familiaris*\*  *Panthera leo*\*  *Panthera pardus*\*  *Panthera tigris*\*  *Accipter badius*\*  *Python molurus*\* | Influenza A2  Kyasanur Forest Disease Virus  *Rotavirus*  Rubulavirus simian virus 5  Ectoparasites  Biting flies | *Panthera leo* range now restricted to Gir Forest. Langurs presumably worried about human-initiated conservation efforts | 2 |
| *Semnopithecus entellus* | Himalayas | *Canis aureus*  *Canis lupus familiaris*  *Felis chaus*  *Panthera pardus*\*  *Aquila* spp. | *Oesophagostomum* spp.  Ectoparasites  Biting flies | Asiatic black bears (*Ursus thibetanus*) and snow leopards (*Panthera uncia*) overlap but are considered minor threats due to dietary preferences and rarity | 3 |
| *Semnopithecus johnii* | Western Ghats | *Cuon alpinus*  *Canis lupus familiaris*\*  *Panthera pardus*\*  *Panthera tigris* | Spirurida  Strongylidae  *Trichuris*  Ectoparasites  Biting flies |  | 4 |
| *Semnopithecus vetulus* | Sri Lanka | *Canis lupus familiaris*\*  *Panthera pardus*\*  *Ictinaetus malayensis*  *Python molurus* | *Esherichia coli*  *Cryptosporidium* sp.  *Entamoeba histolytica*  *Enterobius sp.*  *Trichuris* sp.  Ectoparasites  Biting flies |  | 5 |

Review references: Seidensticker 1983; Rajpurohit and Sommer 1991; Nunn and Altizer 2005

Specific references: 1. Ripley 1965 p. 44, 47, 1970, Muckenhirn 1972 pp. 191-194, Seidensticker 1983, Dewit et al. 1991; 2. Trapido et al. 1964, Rahaman 1973, Starin 1978, Seidensticker 1983, Newton 1985b, Rajpurohit and Sommer 1991, Holbrook 2012; 3. Bishop 1975 pp. 67-70, Curtin 1975 pp. 34-38, Kumar et al. 2018; 4. Poirier 1970, Rajendran et al. 2004, Roy et al. 2012; 5. Ripley 1970, Seidensticker 1983, Dewit et al. 1991, Vandercone et al. 2012

**Table 13.8.** Social structure and organization of *Semnopithecus* at selected sites. Note that differences in methodology may render strict cross-study comparisons problematic. Group size = reproductive group size; all-male bands = cohesive band(s) of three or more males reported, yes (Y) or no (N); MM-MF = multi-male, multi-female, OMU = one-male unit

| **Species** | **Site** | **Habitat** | **Social organization** | **N** | **Group size** | **Adult males** | **Adult females** | **Im-matures** | **All- male bands?** | **Refs** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Semnopithecus entellus* | Eastern University, Sri Lanka | College campus, forest, agricultural land | MM-MF | 1 | 16 | 3 | 4 | 9 |  | 1 |
| *Semnopithecus entellus* | Polonnaruwa, Sri Lanka | dry forest, archeolog-ical  reserve | MM-MF, OMU | 4 | 26.8 | 5.5 | 11.8 | 9.5 | Y | 2 |
| *Semnopithecus entellus* | Kaludiyapokuna Forest Reserve, Sri Lanka | dry forest | MM-MF | 2 | 17.5 | 2.5 | 6 | 9 |  | 3 |
| *Semnopithecus entellus* | Dharwar, India | dry deciduous forest,  scrub | OMU, MM-MF | 38 | 15.1 | 1.6 | 8.0 | 5.4 | Y | 4 |
| *Semnopithecus entellus* | Orcha, India | forest | MM-MF | 3 | 18.7 | 3.7 | 6 | 9 | Y | 5 |
| *Semnopithecus entellus* | Gir Sanctuary, India | dry deciduous forest | MM-MF, OMU | 11 | 29.9 | 2.1 | 13 | 14.8 | Y | 6 |
| *Semnopithecus entellus* | Kumbhalgarh Wildlife Sanctuary, India | dry deciduous forest | OMU | 3 | 37.3 | 1 | 16.3 | 20 | Y | 7 |
| *Semnopithecus entellus* | Kanha Tiger Reserve, India | moist deciduous forest, meadow | OMU, MM-MF | ~44 | 19.6 | 1.3 | 9.3 | 9 | Y | 8 |
| *Semnopithecus entellus* | Jessore District, Bangladesh | open woodland, open plains, cultivated land, village | MM-MF, OMU | 7 | 22 | 2.6 | 4.4 | 15 | Y | 9 |
| *Semnopithecus entellus* | Singur, India | village | OMU | 2 | 12.8 | 1 | 5 | 6.8 | Y | 10 |
| *Semnopithecus entellus* | Mount Abu, India | village | OMU, MM-MF | 3 | 20 | 1.7 | 7.7 | 10.7 | Y | 11 |
| *Semnopithecus entellus* | Jodhpur, India | open scrub, cultivated land, village | OMU, MM-MF | 3 | 21.3 | 1.0 | 10.3 | 10.0 | Y | 12 |
| *Semnopithecus entellus* | Kaukori, India | village, cultivated land | MM-MF | 1 | 54 | 6 | 19 | 29 | Y | 5 |
| *Semnopithecus entellus* | Jaipur, India | arid scrub,  dry forest, village | OMU, MM-MF | 13 | 51 | 1.1 | 23.5 | 26.4 | Y | 13 |
| *Semnopithecus entellus* | Ramnagar, Nepal | Sal forest | MM-MF, OMU |  | 18.3 | 2.5 | 6.6 | 9.2 | N | 14 |
| *Semnopithecus entellus* | Junbesi, Nepal | Himalayan | MM-MF, OMU | 6 | 10.8 | 1.9 | 4.3 | ~4.6 | N | 15 |
| *Semnopithecus entellus* | Melemchi, Nepal | Himalayan | MM-MF | 1 | 32 | 5 | 8 | 19 | N | 16 |
| *Semnopithecus entellus* | Langtang National Park, Nepal | Himalayan | MM-MF | 1 | 30 | 3 | 10 | 17 | N | 17 |
| *Semnopithecus entellus* | Simla Region, India | Himalayan | MM-MF, OMU | 12 | ≥37.9 | 3.6 | 14.3 | 20 | Y | 18 |
| *Semnopithecus entellus* | Machiara National Park, Pakistan | Himalayan | OMU, MM-MF | 9 | 73 | 2.1 | 19.4 | 51.4 | Y | 19 |
|  |  |  |  |  |  |  |  |  |  |  |
| *Semnopithecus johnii* | Mundanthurai Wildlife Sanctuary, India | shola | OMU, MM-MF | 3-6 | Initial  16.7  Post-fission  8.3 | Initial  2  Post-fission  1 | Initial  6.7  Post-fission  3.3 | Initial  8  Post-fission  4 |  | 20 |
| *Semnopithecus johnii* | Periyar Sanctuary, India | tropical evergreen and deciduous forest | MM-MF | 2 | 19 | 2.5 | 6 | 10.5 | N | 21 |
| *Semnopithecus johnii* | Parambikulam Tiger Reserve | tropical evergreen and deciduous forest | OMU, MM-MF | 18 | Ever-green  11.8  Decid-uous  3.7 | Ever-green  1.5  Decid-uous  1.1 | Ever-green  4.8  Decid-uous  1.8 | Ever-green  5.5  Decid-uous  ~0.8 | Y | 22 |
| *Semnopithecus johnii* | Nelliyampathy Reserve Forest, India | tropical moist deciduous forest | OMU |  | ~7 | 1 |  |  | Y | 23 |
| *Semnopithecus johnii* | Anaimalai Hills, India | tropical evergreen forest | OMU, MM-MF | 1-2 | Initial  12  Post-fission  6 | Initial  2  Post-fission  1 | Initial  4  Post-fission  2 | Initial  6  Post-fission  3 |  | 20 |
| *Semnopithecus johnii* | Silent Valley National Park, India | evergreen forest | OMU, MM-MF | 85 | 5.9 | ~1.2 | ~2.4 | 2.0 | N | 24 |
| *Semnopithecus johnii* | Naduvattam, India | shola | OMU | 1 | 11 | 1 | 7 | 3 |  | 25 |
| *Semnopithecus johnii* | Nilgiri District, India | shola | OMU, MM-MF | ~14 | 8.9 |  |  |  | Y | 26 |
|  |  |  |  |  |  |  |  |  |  |  |
| *Semnopithecus vetulus* | Horton Plains, Sri Lanka | tropical cloud forest | OMU | 20 | 9.0 |  |  |  | Y | 27 |
| *Semnopithecus vetulus* | Talangama Wetlands, Sri Lanka | home gardens, plantation | MM-MF, OMU | 5 | 14.4 | 1.6 | 5.2 | 7.6 |  | 28 |
| *Semnopithecus vetulus* | Kaludiyapokuna Forest Reserve, Sri Lanka | dry forest | OMU | 1 | 11 | 1 | 6 | 4 |  | 3 |
| *Semnopithecus vetulus* | Polonnaruwa, Sri Lanka | dry forest, archeolog-ical  reserve | OMU, MM-MF | 29 | 8.6 |  |  |  | Y | 27 |
| *Semnopithecus vetulus* | Polonnaruwa, Sri Lanka | dry forest, archeolog-ical  reserve | OMU | 3 | 7.3 | 1 | 3.7 | 2.7 |  | 29 |

Review references: Newton 1988; Koenig and Borries 2001; Sterck 2012

Specific references: 1. Ahamed and Dharmaretnam 2003; 2. Ripley 1965 pp. 63, 80-81, Koenig and Borries 2001; 3. Vandercone et al. 2012; 4. Calculated from Sugiyama 1964; 5. Jay 1965, Dolhinow 1972; 6. Averaged from Rahaman 1973 and April counts of Starin 1978; 7. Chhangani 2002 (data from 1999 census); 8. Averaged from Newton 1988; 9. Rahman et al. 2015; 10. Oppenheimer 1977; 11. calculated from initial troop compositions in Hrdy 1974; 12. Sommer 1985, cited in Sterck 2012, Koenig and Borries 2001; 13. Calculated from Reena and Ram 1992; 14. Borries et al. 2001; 15. calculated from Boggess 1980, see also Bishop 1979; 16. Bishop 1975 p. 61; 17. median group size and modal adult numbers from Sayers and Norconk 2008; 18. Calculated from Sugiyama 1976; 19. Calculated from Minhas et al. 2010; 20. Hohmann 1989b; 21. initial counts from Srivastava et al. 1996, see also Tanaka 1965 concerning lack of all-male bands; 22. calculated from Roy 2012; 23. Kavana et al. 2014; 24. Joseph and Ramachandran 2003, unidentified adults only included for group size; 25. Kavana et al. 2015a; 26. Poirier 1970; 27. Rudran 1973a; 28. Moore et al. 2010; 29. Hohmann 1990