Quasi-stationary Distributions: A Bibliography

P.K. Pollett

This bibliography is no longer maintained (last updated 13 March 2015).
Please refer to the review paper: Van Doorn and Pollett [431]

Abstract

Quasi-stationary distributions have been used to model the long-term behaviour of stochastic systems which in some sense terminate, but appear to be stationary over any reasonable time scale. Imagine population is observed to be extant at some time t. What is the chance of there being precisely i individuals present? If we were equipped with the full set of state probabilities, we would evaluate the probability $u_i(t)$ of the being i individuals present *conditional on their being at least* 1. It would then be natural for us to seek a distribution $(u_i,\, i \in S)$ over the set of extant states S such that if $u_i(s) = u_i$ for a particular $s > 0$, then $u_i(t) = u_i$ for all $t > s$. Such a distribution is called a *stationary conditional distribution* or *quasi-stationary distribution*. This distribution might then also be a *limiting conditional distribution* in that $u_i(t) \to u_i$ as $t \to \infty$, and thus be of use in modelling the long-term behaviour of the process.

Yaglom [453] was the first to identify explicitly a limiting conditional distribution, establishing the existence of such for the subcritical Bienaymé-Galton-Watson branching process. However, the idea of a limiting conditional distribution goes back much further, at least to Wright [449, Page 111] in his discussion of gene frequencies in finite populations. The idea of "quasi stationarity" was crystalized by Bartlett [32, Page 38] and he later coined the term "quasi-stationary distribution" [33, Page 24]. But, it was not until the early sixties, and largely stimulated by the remarkable work of Vere-Jones [440], and later Kingman [221], Darroch and Seneta [99], Seneta and Vere-Jones [385], and Darroch and Seneta [100], that a general theory was annunciated. Since then, quasi-stationary distributions have appeared in a variety of diverse contexts, including chemical reaction kinetics, reliability theory, genetics, epidemics, ecology, finance, and telecommunications, and this work has stimulated further developments in the theory. Modern key papers in the area are Ferrari, Kesten, Martínez and Picco [124] and Kesten [201].

I present here a bibliography of work on quasi-stationary distributions. This includes work on quasi-stationary distributions *per se* (stationary conditional distributions), limiting conditional distributions (often *called* quasi-stationary distributions, and also called *Yaglom limits* and *quasi-limiting distributions*), the companion topics of geometric and exponential ergodicity, R-classification of states and R-invariant measures (et cetera), ratio limit theorems, analysis of processes conditioned to stay within a given region (particularly weak convengence of those processes), and papers dealing with diffusion approximations which specifically describe quasi stationarity of evanescent processes.

Published work is cited under various headings. Several works appear under more than one heading. The final section lists the same works in chronological order.

Whilst I do not claim that the bibliography is exhaustive, I do hope that it includes most of the work published on quasi-stationary distributions. I welcome additions and corrections. I would particularly like to hear about Ph.D. theses in the area (they are very difficult to trace). Please e-mail me at `pkp@maths.uq.edu.au`. *I would appreciate it very much if authors would send me BibTeX entries for their work.*

This bibliography is located at

`http://www.maths.uq.edu.au/~pkp/papers/qsds/qsds.html`

1 Textbooks

Anderson [10]
Bartlett [33]
Collet, Martínez and San Martín [88]
Gyllenberg and Silvestrov [161]
Kijima [211]
May [276]
Nåsell [295]
Seneta [383]

2 Ph.D. theses

Breyer [54]
Day [101]
Hart [166]
Landon [246]
Parsons [320]
Sirl [395]
Walker [446]

3 Reviews

Méléard and Villemonais [280]
van Doorn and Pollett [431]

4 General theory

This section on the general theory of quasi-stationary distributions also including papers on the related topics of geometric and exponential ergodicity, classifications of states, and ratio limit theorems.

4.1 Ratio limit theory

Cheong [76]
Cohn [84]
Collet, Martínez and San Martín [87]
Doney [112]
Enderle and Hering [116]
Ferrari, Kesten, Martínez and Picco [124]
Foguel [134]

Foguel and Lin [135]
Gerl [140]
Giné, Koltchinskii and Wellner [146]
Handelman [163]
Hou [176]
Isaac [181]
Isaac [182]
Kersting [198]
Kesten [199]
Kesten [201]
Kingman and Orey [222]
Lamb [241]
Levitan [251]
Levitan [252]
Lin [259]
Lin [260]
Mucci [285]
Narimanjan [288]
Nummelin [298]
Nummelin [299]
Oman [302]
Oman [303]
Oshima [307]
Papangelou [319]
Pollard [334]
Port [365]
Pruitt [367]
Rootzén [373]
Salminen [374]
Shur [390]
Shur [391]
Shur [392]
Stone [400]
Stone [401]
Šur [403]
Šur [404]
Van Doorn and Schrijner [435]
Zhao and Jin [459]
Zhao and Ying [460]

4.2 Discrete-time Markov chains

Al-Eideh [2]
Al-Eideh [3]
Al-Eideh and Al-Towaiq [4]
Al-Towaiq and Al-Eideh [5]

Al-Towaiq and Al-Eideh [6]
Brown [59]
Buckley and Pollett [61]
Buiculescu [63]
Callaert [66]
Coolen-Schrijner and Pollett [91]
Coolen-Schrijner and van Doorn [92]
Darroch and Seneta [99]
Isaacson [183]
Kesten [201]
Kijima [205]
Kijima [209]
Kijima [210]
Lambert [244]
Lasserre and Pearce [247]
Ledoux [249]
Ledoux, Rubino and Sericola [250]
Mandl [267]
Martínez and San Martín [273]
Pollak and Siegmund [333]
Seneta and Vere-Jones [385]
Strunkov [402]
Teugels [409]
Tweedie [425]
Van Doorn and Pollett [430]
Van Doorn and Schrijner [437]
Van Doorn and Schrijner [436]
Vere-Jones [440]
Vere-Jones [441]
Vere-Jones [442]

4.3 Continuous-time Markov chains

Abate and Whitt [1]
Anisimov and Pushkin [12]
Artalejo and Lopez-Herrero [18]
Breyer and Roberts [57]
Buiculescu [62]
Buiculescu [65]
Callaert [66]
Chen and Strook [74]
Coolen-Schrijner, Hart and Pollett [90]
Darlington and Pollett [98]
Darroch and Seneta [100]
Elmes, Pollett and Walker [114]
Elmes, Pollett and Walker [115]

Ferrari, Martínez and Picco [129]
Ferrari, Kesten, Martínez and Picco [124]
Flaspohler [132]
Gray, Pollett and Zhang [154]
Hart and Pollett [169]
Hart and Pollett [168]
Hart and Pollett [170]
Hart, Martínez and San Martín [167]
Jacka and Roberts [185]
Kijima [209]
Kijima [208]
Kijima [210]
Kingman [221]
Kingman [220]
Lambert [244]
Ledoux [249]
Ledoux, Rubino and Sericola [250]
Li and Xiao [256]
Lin, Zhang and Hou [262]
Mei and Lin [279]
Moler, Plo and San Miguel [282]
Nair and Pollett [287]
Nair and Pollett [286]
Pakes [312]
Pakes [316]
Polak and Rolski [332]
Pollett [337]
Pollett [340]
Pollett [341]
Pollett [344]
Pollett [348]
Pollett [349]
Pollett [354]
Pollett [356]
Pollett and Roberts [360]
Pollett and Vere-Jones [363]
Pollett and Zhang [364]
Seneta and Tweedie [384]
Sirl [395]
Steinsaltz Evans [397]
Tweedie [418]
Tweedie [419]
Vere-Jones [443]
Walker [445]
Waugh [448]
Wu [450]
Wu [451]

Wu [452]
Yong [455]

4.4 Semi-Markov and Markov-renewal processes

Arjas and Nummelin [14]
Arjas, Nummelin and Tweedie [15]
Cheong [75]
Cheong [76]
Cheong [78]
Cheong [77]
Flaspohler and Holmes [133]
Gyllenberg and Silvestrov [159]
Nummelin [296]
Nummelin [297]
Petersson [327]
Silvestrov [393]
Teugels [408]

4.5 Markov processes on a general state space

Arjas, Nummelin and Tweedie [15]
Bebbington, Pollett and Zheng [38]
Bertoin [45]
Breyer and Roberts [57]
Enderle and Hering [116]
Folkman and Port [136]
Glover [147]
Groisman and Jonckheere [156]
Haas and Rivero [162]
Isaac [182]
Lambert [244]
Lin [261]
Klebaner, Lazar and Zeitouni [225]
Miura [281]
Nummelin and Arjas [300]
Nummelin and Tweedie [301]
Orey [306]
Pollard and Tweedie [335]
Pollard and Tweedie [336]
Roberts [370]
Tuominen and Tweedie [412]
Tuominen and Tweedie [414]
Tweedie [422]
Tweedie [420]

Tweedie [421]
Tweedie [424]
Zhang, Li and Song [458]

4.6 Dynamical systems

Berglund and Gentz [43]
Faure and Schreiber [121]
Khasminskii, Yin and Zhang [202]
Li, Yin, Yin and Zhang [257]
Klebaner and Lazar [224]

4.7 Miscellaneous

Asselah and Castell [19]
Asselah and Dai Pra [20]
Asselah and Ferrari [21]
Avrachenkov, Borkar and Nemirovsky [23]
Arguin and Aizenman [13]
Bobrowski [49]
Breyer, Roberts and Rosenthal [53]
Collet, Martínez and Schmitt [89]
Dickman and Vidigal [109]
Ferrari and Martínez [127]
Fierro, Martínez and San Martín [131]
Glynn and Thorisson [148]
Glynn and Thorisson [149]
Green [155]
Gyllenberg and Silvestrov [160]
Huisinga, Meyn and Schütte [178]
Kang and Klotz [188]
Knoth [227]
Kulik and Soulier [229]
Martínez [270]
Móricz [283]
Móricz [284]
O'Neill [304]
Petersen and Schmidt [326]
Ramanan and Zeitouni [368]
Serfling [387]
Turkman [415]
Wang and Wang [447]
Zuparov and Mamadaliev [463]

5 Diffusion approximations

Barbour [26]
Barbour [27]
Barbour [28]
Barbour [29]
Barbour [30]
Barbour [31]
Kurtz [230]
Kurtz [231]
Kurtz [233]
Kurtz [234]
McNeil and Schach [277]

6 Special processes

6.1 Cellular automata

Atman and Dickman [22]
Ferrari, Kesten and Martínez [123]
Martínez [269]

6.2 Birth-death processes

Artalejo and Lopez-Herrero [18]
Callaert and Keilson [68]
Callaert and Keilson [69]
Callaert [67]
Cavender [71]
Chan [72]
Clancy and Pollett [82]
Collet, Martínez, Méléard and San Martín [85]
Coolen-Schrijner and van Doorn [93]
Diaconis and Miclo [107]
Ferrari, Martínez and Picco [128]
Gao and Mao [137]
Good [150]
Keilson and Ramaswamy [191]
Keilson and Ramaswamy [192]
Kesten [200]
Kijima [206]
Kijima [204]
Kijima, Nair, Pollett and van Doorn [216]

Kijima and Seneta [217]
Lambert [244]
Mandl [268]
Martínez [269]
Martínez and Vares [274]
Parthasarathy, Lenin, Schoutens and van Assche [322]
Roberts and Jacka [371]
Roberts, Jacka and Pollett [372]
Schoutens [377]
Schrijner and van Doorn [378]
Van Doorn [427]
Van Doorn [429]
van Doorn [438]
Van Doorn and Schrijner [435]
Van Doorn and Schrijner [434]
Zhang and Liu [456]
Zhang and Zhu [457]

6.3 Branching processes

Bagley [25]
Buiculescu [64]
Cheong [79]
Curien and Peres [94]
Evans [117]
Ezhov and Reshetnyak [120]
Geiger [139]
Heathcote, Seneta and Vere-Jones [172]
Kimmel [219]
Kurtz and Wainger [235]
Lambert [243]
Lambert [244]
Pakes [310]
Pakes [312]
Pakes [313]
Seneta and Vere-Jones [386]
Vatutin and Dyakonova [439]
Yaglom [453]
Zolotarev [462]

6.4 Brownian motion

Awad and Glynn [24]
Collet, Martínez and San Martín [87]
Ferrari, Martínez and San Martín [130]

Garbit [138]
Housworth [177]
Klass and Pitman [223]
Martínez and San Martín [272]
Martínez Picco and San Martín [271]
Salminen [374]
Serlet [388]

6.5 Catastrophe processes

Pakes [311]
Pakes and Pollett [317]

6.6 Diffusions and related processes

Cattiaux, Collet, Lambert, Martínez, Méléard and San Martín [70]
Collet, Martínez and San Martín [86]
Kennedy [197]
Kao [189]
Lambert [242]
Pinsky [330]
Pinsky [331]
Jacka and Roberts [184]
Jacka and Roberts [186]
Kyprianou and Palmowski [236]
Lambert [244]
Lladser and San Martín [264]
Steinsaltz and Evans [398]
Villemonais [444]
Ye [454]

6.7 Quasi-birth-death processes

Bean, Bright, Latouche, Pearce, Pollett and Taylor [34]
Bean, Pollett and Taylor [35]
Bean, Pollett and Taylor [36]
Bean, Pollett and Taylor [37]
Pearce [324]

6.8 Queues and related models

Awad and Glynn [24]
Boucherie [51]

Ferrari and Lopes Garcia [125]
Kennedy [197]
Kibkalo [203]
Kijima [207]
Kijima and Makimoto [213]
Kijima and Makimoto [214]
Kijima and Makimoto [215]
Kijima and Makimoto [212]
Kyprianou [237]
Kyprianou [238]
Kyprianou [239]
Li [253]
Li and Zhao [254]
Li and Zhao [255]
Makimoto [265]
Topolski [410]
Tuominen and Tweedie [413]
Van Doorn and Regterschot [432]

6.9 Random walks

Bertoin and Doney [46]
Bertoin and Doney [47]
Bertoin and Doney [48]
Bolthausen [50]
Daley [95]
Doney [110]
Doney [111]
Doney [112]
Iglehart [180]
Iglehart [179]
Kao [189]
Keener [190]
Pakes [309]
Ritter [369]
Seneta [379]
Shimura [389]
Stadje [396]
Szubarga and Szynal [406]
Szubarga and Szynal [405]
Szubarga and Szynal [407]
Zhao and Ying [460]

6.10 Fleming-Viot processes

Ferrari [122]

6.11 CSBP

Labbé [240]

6.12 Contact process

Dickman and de Oliveira [108]
de Oliveira and Dickman [105]
de Oliveira and Ferreira [106]

7 Computational methods

Aldous, Flannery and Palacios [8]
Bebbington [39]
Bebbington [40]
Bebbington and Stewart [41]
Boucherie and van Doorn [52]
Guo and Zhao [157]
de Oliveira and Dickman [104]
Pollett [346]
Pollett and Roberts [360]
Pollett and Stewart [361]

8 Truncation methods

Most of the papers listed in this section concern the evaluation of *stationary distributions*, but I have included here work which might easily be adapted to handle *quasi-stationary distributions*.

Breyer and Hart [55]
Breyer and Hart [56]
Gibson and Seneta [143]
Gibson and Seneta [142]
Hart and Tweedie [171]
Pearce and Shin [323]
Seneta [381]
Seneta [382]
Tweedie [417]
Tweedie [418]

Tweedie [423]
Tweedie [425]

9 Applications

9.1 Biology and ecology

Artalejo and Lopez-Herrero [18]
Bartlett [32]
Becker [42]
Buckley and Pollett [60]
Buckley and Pollett [61]
Day and Possingham [102]
Ferrari and Marić [126]
Gilpin and Hanski [144]
Gilpin and Taylor [145]
Gosselin [151]
Gosselin [152]
Grasman [153]
Gyllenberg and Silvestrov [158]
Hanson and Tuckwell [164]
Hanson and Tuckwell [165]
Högnäs [174]
Holling [175]
Klein [226]
Kukhtin, Kuzmenko and Shramko [228]
Lambert [244]
Lambert [245]
Mech [278]
Pakes, Trajstman and Brockwell [318]
Pollett [338]
Pollett [347]
Pollett [350]
Pollett [351]
Pollett [353]
Pollett [352]
Pollett [357]
Pollett [355]
Scheffer [376]
Stirk, Lythe, van den Berg, Hurst and Molina-París [399]
Trajstman [411]

9.2 Chemical kinetics

Dambrine and Moreau [96]

Dambrine and Moreau [97]
Dykman, Horita and Ross [113]
Kurtz [232]
Malek-Mansour and Nicolis [266]
de Oliveira and Dickman [103]
Oppenheim, Schuler and Weiss [305]
Parsons and Pollett [321]
Pollett [339]
Pollett and Vassallo [362]
Turner and Malek-Mansour [416]

9.3 Epidemics

Andersson and Britton [11]
Artalejo, Economou and Lopez-Herrero [17]
Artalejo, Economou and Lopez-Herrero [16]
Artalejo and Lopez-Herrero [18]
Clancy and Mendy [80]
Clancy, O'Neill and Pollett [81]
Clancy and Pollett [82]
Hernández-Suárez and Castillo-Chavez [173]
Martins, Pinto and Stollenwerk [275]
Nåsell [289]
Nåsell [290]
Nåsell [291]
Nåsell [292]
Nåsell [293]
Nåsell [294]
Ovaskainen [308]
Sani, Kroese and Pollett [375]

9.4 Genetics

Lambert [244]
Lambert [245]
Ewens [118]
Ewens [119]
Kendall [196]
Seneta [380]

9.5 Reliability

Cocozza-Thivent and Roussignol [83]
Kalpakam and Shahul Hameed [187]

Pijnenburg and Ravichandran [328]
Pijnenburg, Ravichandran and Regterschot [329]

9.6 Telecommunications

Anantharam [9]
Gibbens, Hunt and Kelly [141]
Kelly [194]
Kelly [195]
Pollett [343]
Pollett [342]
Pollett [345]
Ziedins [461]

9.7 Medicine

Chan, Pollett and Weinstein [73]

9.8 Neuroscience

Berglund and Landon [44]
Landon [246]

10 Significant related material

Brockwell, Gani and Resnick [58]
Kelly [193]
Kijima and van Doorn [218]
Ledermann and Reuter [248]
Li and Li [258]
Liu, Zhang and Zhao [263]
Pakes [314]
Pakes [315]
Peng [325]
Pollett [358]
Pollett [359]
Pruitt [366]
Sirl, Zhang and Pollett [394]
Van Doorn and Schrijner [433]
Van Doorn [426]
Van Doorn [428]

11 Chronological order

1947

Yaglom [453]

1951

Scheffer [376]

1954

Ledermann and Reuter [248]

1957

Bartlett [32]
Zolotarev [462]

1958

Waugh [448]

1960

Bartlett [33]
Mandl [267]

1962

Vere-Jones [440]

1963

Albert [7]
Ewens [118]
Kingman [221]
Kingman [220]

1964

Ewens [119]
Kingman and Orey [222]
Mandl [268]
Pruitt [366]

1965

Darroch and Seneta [99]
Port [365]
Pruitt [367]

1966

Folkman and Port [136]
Kendall [196]
Mech [278]
Seneta [379]
Seneta [380]
Seneta and Vere-Jones [385]

Stone [400]

1967

Cheong [75]
Darroch and Seneta [100]
Heathcote, Seneta and Vere-Jones [172]
Isaac [181]
Orey [306]
Papangelou [319]
Seneta [381]
Stone [401]
Vere-Jones [441]

1968

Cheong [76]
Good [150]
Klein [226]
Seneta and Vere-Jones [386]
Seneta [382]
Teugels [409]
Teugels [408]
Vere-Jones [442]

1969

Daley [95]
Foguel [134]
Vere-Jones [443]

1970

Becker [42]
Cheong [78]
Cheong [77]
Kesten [200]
Kesten [199]
Kurtz [230]
Lin [259]
Levitan [251]

1971

Kurtz [231]
Kyprianou [237]
Levitan [252]
Tweedie [417]

1972

Buiculescu [62]
Cheong [79]
Flaspohler and Holmes [133]

Foguel and Lin [135]
Isaac [181]
Kesten [199]
Kingman and Orey [222]
Levitan [251]
Levitan [252]
Lin [259]
Lin [260]
Papangelou [319]
Port [365]
Pruitt [367]
Stone [400]
Stone [401]

1973

Buiculescu [63]
Callaert and Keilson [68]
Callaert and Keilson [69]
Holling [175]
Kurtz and Wainger [235]
Lamb [241]
McNeil and Schach [277]
Pakes [309]
Tweedie [418]

1974

Barbour [26]
Barbour [27]
Callaert [66]
Callaert [67]
Cohn [84]
Flaspohler [132]
Gerl [140]
Iglehart [180]
Iglehart [179]
Kennedy [197]
Kennedy [197]
Kersting [198]
May [276]
Tweedie [422]
Tweedie [420]
Tweedie [421]
Tweedie [419]

1975

Buiculescu [64]
Malek-Mansour and Nicolis [266]

Narimanjan [288]
Pakes [310]
Pollard and Tweedie [335]
Tweedie [423]
Yong [455]

1976

Barbour [28]
Bolthausen [50]
Kurtz [233]
Lin [261]
Mucci [285]
Nummelin [296]
Nummelin and Arjas [300]
Pollard and Tweedie [336]

1977

Arjas and Nummelin [14]
Green [155]
Móricz [283]
Nummelin [297]
Oman [302]
Oppenheim, Schuler and Weiss [305]

1978

Cavender [71]
Evans [117]
Hanson and Tuckwell [164]
Kao [189]
Kao [189]
Kurtz [234]
Nummelin [298]
Nummelin and Tweedie [301]
Oman [303]
Turner and Malek-Mansour [416]

1979

Barbour [29]
Isaacson [183]
Nummelin [299]
Pakes, Trajstman and Brockwell [318]
Tuominen and Tweedie [412]
Tuominen and Tweedie [413]

1980

Arjas, Nummelin and Tweedie [15]
Arjas, Nummelin and Tweedie [15]
Barbour [30]

Barbour [31]
Móricz [284]
Serfling [387]
Šur [403]
Van Doorn [426]

1981

Dambrine and Moreau [96]
Dambrine and Moreau [97]
Hanson and Tuckwell [165]
Ritter [369]
Seneta [383]
Trajstman [411]
Tweedie [424]

1982

Bagley [25]
Brockwell, Gani and Resnick [58]
Enderle and Hering [116]
Zuparov and Mamadaliev [463]

1983

Chen and Strook [74]
Doney [110]
Ezhov and Reshetnyak [120]
Isaac [182]
Kalpakam and Shahul Hameed [187]
Kelly [193]
Šur [404]
Turkman [415]

1984

Keilson and Ramaswamy [191]

1985

Anisimov and Pushkin [12]
Doney [111]
Kelly [194]
Kibkalo [203]
Parsons [320]
Pinsky [330]
Seneta and Tweedie [384]
Szubarga and Szynal [406]
Szubarga and Szynal [405]
Szubarga and Szynal [407]
Van Doorn [427]

1986

Glover [147]
Keilson and Ramaswamy [192]
Pollak and Siegmund [333]
Pollett [337]

1987

Gibson and Seneta [143]
Gibson and Seneta [142]
Kelly [195]
Pakes [311]
Parsons and Pollett [321]
Pollett [338]
Rootzén [373]
Shur [390]
Van Doorn [428]
Ziedins [461]

1988

Aldous, Flannery and Palacios [8]
Jacka and Roberts [184]
Pollett [340]
Pollett [339]
Topolski [410]
Van Doorn and Regterschot [432]

1989

Abate and Whitt [1]
Buiculescu [65]
Pakes and Pollett [317]
Pollett [341]

1990

Al-Eideh and Al-Towaiq [4]
Gibbens, Hunt and Kelly [141]
Pijnenburg and Ravichandran [328]
Pijnenburg, Ravichandran and Regterschot [329]
Pollett and Roberts [360]

1991

Al-Towaiq and Al-Eideh [5]
Anderson [10]
Brown [59]
Ferrari, Martínez and Picco [128]
Gilpin and Hanski [144]
Kijima and Seneta [217]
Nåsell [289]
Pollett [344]
Pollett [343]

Pollett [342]
Roberts [370]
Shimura [389]
Van Doorn [429]

1992

Anantharam [9]
Ferrari, Martínez and Picco [129]
Keener [190]
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Kijima [205]
Kijima and Makimoto [213]
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Klass and Pitman [223]
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Nair and Pollett [286]
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Pakes [313]
Pinsky [331]
Pollett [348]
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Van Doorn and Schrijner [433]

1994

Al-Eideh [2]
Al-Towaiq and Al-Eideh [6]
Bertoin and Doney [46]
Bertoin and Doney [47]
Bertoin and Doney [48]
Ferrari and Martínez [127]
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Ledoux, Rubino and Sericola [250]
Martínez and San Martín [272]
Pollett and Stewart [361]
Roberts and Jacka [371]
Tuominen and Tweedie [414]

1995

Al-Eideh [3]
Bebbington [39]
Bebbington, Pollett and Zheng [38]
Collet, Martínez and San Martín [86]
Day [101]
Day and Possingham [102]
Dykman, Horita and Ross [113]
Ferrari, Kesten, Martínez and Picco [124]
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Pakes [316]
Pollard [334]
Pollett [349]
Van Doorn and Schrijner [435]
Van Doorn and Schrijner [434]
Wang and Wang [447]

1996

Bean, Pollett and Taylor [35]
Bebbington and Stewart [41]
Breyer and Hart [55]
Cocozza-Thivent and Roussignol [83]
Collet, Martínez and Schmitt [89]
Elmes, Pollett and Walker [114]
Ferrari, Kesten and Martínez [123]
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Hart and Pollett [168]
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Nåsell [290]

Peng [325]
Pollett [350]
Serlet [388]
Van Doorn and Schrijner [437]
Van Doorn and Schrijner [436]

1997

Bean, Bright, Latouche, Pearce, Pollett and Taylor [34]
Bebbington [40]
Bertoin [45]
Boucherie [51]
Breyer [54]
Ferrari, Martínez and San Martín [130]
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Pakes [315]
Petersen and Schmidt [326]
Pollett [351]
Roberts, Jacka and Pollett [372]
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1998

Bean, Pollett and Taylor [36]
Boucherie and van Doorn [52]
Chan [72]
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Kang and Klotz [188]
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Parthasarathy, Lenin, Schoutens and van Assche [322]
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1999

Breyer and Roberts [57]
Collet, Martínez and San Martín [87]
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Fierro, Martínez and San Martín [131]
Gyllenberg and Silvestrov [159]
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Nåsell [293]
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Pollett [353]
Pollett [352]
Ramanan and Zeitouni [368]
Strunkov [402]

2000

Andersson and Britton [11]
Bean, Pollett and Taylor [37]
Coolen-Schrijner, Hart and Pollett [90]
Darlington and Pollett [98]
Elmes, Pollett and Walker [115]
Geiger [139]
Gyllenberg and Silvestrov [160]
Hart and Pollett [170]
Lambert [242]
Lladser and San Martín [264]
Moler, Plo and San Miguel [282]
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2001

Asselah and Dai Pra [20]
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Clancy, O'Neill and Pollett [81]
Glynn and Thorisson [148]
Gosselin [152]
Lasserre and Pearce [247]
Li and Xiao [256]
Mei and Lin [279]
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Pollett [357]
Pollett [355]
Wu [450]

2002

Asselah and Ferrari [21]
Atman and Dickman [22]
Glynn and Thorisson [149]
Li and Zhao [254]

Lin, Zhang and Hou [262]
Pollett [356]
Shur [391]
Zhao and Jin [459]
Dickman and Vidigal [109]

2003

Asselah and Castell [19]
Clancy and Pollett [82]
Giné, Koltchinskii and Wellner [146]
Hart, Martínez and San Martín [167]
Li and Zhao [255]
Wu [451]

2004

Huisinga, Meyn and Schütte [178]
de Oliveira and Dickman [103]
Pollett and Zhang [364]
Shur [392]
Steinsaltz Evans [397]
Vatutin and Dyakonova [439]
Wu [452]

2005

Dickman and de Oliveira [108]
Gray, Pollett and Zhang [154]
Hart and Tweedie [171]
Nåsell [294]
de Oliveira and Dickman [104]
Zhao and Ying [460]

2006

Coolen-Schrijner and van Doorn [92]
Coolen-Schrijner and van Doorn [93]
Kyprianou and Palmowski [236]
de Oliveira and Dickman [105]

2007

Ferrari and Marić [126]
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Pollett [358]
Sani, Kroese and Pollett [375]
Silvestrov [393]
Sirl, Zhang and Pollett [394]
Steinsaltz and Evans [398]

2008

Gyllenberg and Silvestrov [161]
Lambert [244]
Liu, Zhang and Zhao [263]
Martínez [270]
de Oliveira and Ferreira [106]
Pollett [359]
Ye [454]

2009

Arguin and Aizenman [13]
Awad and Glynn [24]
Buckley and Pollett [60]
Cattiaux, Collet, Lambert, Martínez, Méléard and San Martín [70]
Chan, Pollett and Weinstein [73]
Diaconis and Miclo [107]
Garbit [138]
Li and Li [258]
Van Doorn and Pollett [430]

2010

Artalejo, Economou and Lopez-Herrero [16]
Artalejo and Lopez-Herrero [18]
Avrachenkov, Borkar and Nemirovsky [23]
Buckley and Pollett [61]
Hernández-Suárez and Castillo-Chavez [173]
Lambert [245]
Li [253]
Stirk, Lythe, van den Berg, Hurst and Molina-París [399]

2011

Clancy and Mendy [80]
Collet, Martínez, Méléard and San Martín [85]
Curien and Peres [94]
Martínez and San Martín [273]
Nåsell [295]
Villemonais [444]

2012

Berglund and Landon [44]
Collet, Martínez and San Martín [88]
Guo and Zhao [157]
Haas and Rivero [162]
Landon [246]
Martins, Pinto and Stollenwerk [275]
Méléard and Villemonais [280]
Polak and Rolski [332]
van Doorn [438]
van Doorn and Pollett [431]

Zhang and Liu [456]

2013

Artalejo, Economou and Lopez-Herrero [17]
Ferrari [122]
Groisman and Jonckheere [156]
Labbé [240]
Petersson [327]
Zhang and Zhu [457]
Kulik and Soulier [229]

2014

Berglund and Gentz [43]
Faure and Schreiber [121]
Miura [281]
Zhang, Li and Song [458]

2015

Gao and Mao [137]

References

[1] J. Abate and W. Whitt. Spectral theory for skip-free Markov chains. *Probab. Eng. Inf. Sci.*, 3:77–88, 1989.

[2] B.M. Al-Eideh. A central limit theorem for absorbing Markov chains with r absorbing states. *J. Inform. Optim. Sci.*, 15:387–392, 1994.

[3] B.M. Al-Eideh. Quasi-stationary distributions in Markov chains with absorbing subchains. *J. Inform. Optim. Sci.*, 16:281–286, 1995.

[4] B.M. Al-Eideh and M.H. Al-Towaiq. A problem related to quasi-stationary distributions of Markov chains. *J. Statist. Res.*, 24:67–76, 1990.

[5] M.H. Al-Towaiq and B.M. Al-Eideh. An application of the McNemar test for the existence of absorbing subchains in a given Markov chain. *J. Inform. Optim. Sci.*, 12:467–475, 1991.

[6] M.H. Al-Towaiq and B.M. Al-Eideh. Quasi-stationary distribution in absorbing Markov chains with r absorbing states. *J. Inform. Optim. Sci.*, 15:89–95, 1994.

[7] E. Albert. Markov chains and λ-invariant measures. *J. Math. Anal. Appl.*, 6:404–418, 1963.

[8] D. Aldous, B. Flannery, and J.L. . Palacios. Two applications of urn processes: the fringe analysis of search trees and the simulation of quasi-stationary distributions. *Probab. Eng. Inf. Sci.*, 2:293–307, 1988.

[9] V. Anantharam. On fast simulation of the time to saturation of slotted ALOHA. *J. Appl. Probab.*, 29(3):682–690, 1992.

[10] W.J. Anderson. *Continuous-Time Markov Chains: An Applications-Oriented Approach*. Springer-Verlag, New York, 1991.

[11] H. Andersson and T. Britton. Stochastic epidemics in dynamic populations: quasi-stationarity and extinction. *J. Math. Biol.*, 41:559–580, 2000.

[12] V.V. Anisimov and S.G. Pushkin. Limiting conditional distribution for a homogeneous Markov chain with a set of strongly communicating states. *Dokl. Akad. Nauk Ukrain. SSR Ser. A*, 12:61–63, 1985.

[13] L. Arguin and M. Aizenman. On the structure of quasi-stationary competing particle systems. *Ann. Probab.*, 37(3):1080–1113, 2009.

[14] E. Arjas and E. Nummelin. Semi-Markov processes and α-invariant distributions. *Stochastic Process. Appl.*, 6:53–64, 1977.

[15] E. Arjas, E. Nummelin, and R.L. Tweedie. Semi-Markov processes on a general state space: α-theory and quasistationarity. *J. Austral. Math. Soc. Ser. A*, 30:187–200, 1980/81.

[16] J.R. Artalejo, A. Economou, and M.J. Lopez-Herrero. The maximum number of infected individuals in SIS epidemic models: computational techniques and quasi-stationary distributions. *J. Comput. Appl. Math.*, 233(10):2563–2574, 2010.

[17] J.R. Artalejo, A. Economou, and M.J. Lopez-Herrero. Stochastic epidemic models with random environment: quasi-stationarity, extinction and final size. *J. Math. Biol.*, 67:799–831, 2013.

[18] J.R. Artalejo and M.J. Lopez-Herrero. Quasi-stationary and ratio of expectations distributions: A comparative study. *J. Theor. Biol.*, 266:264–274, 2010.

[19] A. Asselah and F. Castell. Existence of quasi-stationary measures for asymmetric attractive particlesystems on $\mathbb{Z}^d$. *Ann. Appl. Probab.*, 13:1569–1590, 2003.

[20] A. Asselah and P. Dai Pra. Quasi-stationary measures for conservative dynamics in the infinite lattice. *Ann. Probab.*, 29:1733–1754, 2001.

[21] A. Asselah and P.A. Ferrari. Regularity of quasi-stationary measures for simple exclusion in dimension $d \geq 5$. *Ann. Probab.*, 30:1913–1932, 2002.

[22] A.P.F. Atman and R. Dickman. Quasistationary distributions for the Domany-Kinzel stochastic cellular automaton. *Phys. Rev. E (3)*, 66(4):046135, 9, 2002.

[23] Konstantin Avrachenkov, Vivek Borkar, and Danil Nemirovsky. Quasi-stationary distributions as centrality measures for the giant strongly connected component of a reducible graph. *J. Comput. Appl. Math.*, 234(11):3075–3090, 2010.

[24] H. Awad and P.W. Glynn. Conditional limit theorems for regulated fractional Brownian motion. *Ann. Appl. Probab.*, 19(6):2102–2136, 2009.

[25] J.H. Bagley. Asymptotic properties of subcritical Galton-Watson processes. *J. Appl. Probab.*, 19:510–517, 1982.

[26] A.D. Barbour. The principle of the diffusion of arbitrary constants. *J. Appl. Probab.*, 9:519–541, 1972.

[27] A.D. Barbour. On a functional central limit theorem for Markov population processes. *Adv. Appl. Probab.*, 6:21–39, 1974.

[28] A.D. Barbour. Quasi-stationary distributions in Markov population processes. *Adv. Appl. Probab.*, 8:296–314, 1976.

[29] A.D. Barbour. Density dependent Markov population processes. Preprint, Gonville and Caius College, Cambridge, 1979.

[30] A.D. Barbour. Density dependent Markov population processes. In W. Jager, H. Rost, and P. Tautu, editors, *Biological growth and spread: mathematical theories and applications (Proc. Conf., Heidelberg, 1979), Lecture Notes in Biomathematics*, volume 38, pages 36–49. Springer, Berlin, 1980.

[31] A.D. Barbour. Equilibrium distributions for Markov population processes. *Adv. Appl. Probab.*, 12:591–614, 1980.

[32] M.S. Bartlett. On theoretical models for competitive and predatory biological systems. *Biometrika*, 44:27–42, 1957.

[33] M.S. Bartlett. *Stochastic Population Models in Ecology and Epidemiology*. Methuen, London, 1960.

[34] N.G. Bean, L. Bright, G. Latouche, C.E.M. Pearce, P.K. Pollett, and P.G. Taylor. The quasistationary behaviour of quasi-birth-and-death processes. *Ann. Appl. Probab.*, 7:134–155, 1997.

[35] N.G. Bean, P.K. Pollett, and P.G. Taylor. The quasistationary distributions of homogeneous quasi-birth-and-death processes. In Richard J. Wilson, D.N. Pra Murthy, and Shunji Osaki, editors, *Proceedings of the 2nd Australia-Japan Workshop on Stochastic Models in Engineering, Technology and Management*, pages 44–55, The University of Queensland, 1996. Technology Management Centre.

[36] N.G. Bean, P.K. Pollett, and P.G. Taylor. The quasistationary distributions of level-independent quasi-birth-and-death processes. Special issue in honor of Marcel F. Neuts. *Stochastic Models*, 14:389–406, 1998.

[37] N.G. Bean, P.K. Pollett, and P.G. Taylor. The quasistationary distributions of level-dependent quasi-birth-and-death processes. *Stochastic Models*, 16:511–541, 2000.

[38] M. Bebbington, P.K. Pollett, and X. Zheng. Dual constructions for pure-jump Markov processes. *Markov Processes and Related Fields*, 1:513–558, 1995.

[39] M.S. Bebbington. Evaluating quasistationary behaviour of epidemic models by means of parallel aggregation / disaggregation. In P. Binning, H. Bridgman, and B Williams, editors, *Proceedings of the International Congress on Modelling and Simulation 1995*, volume 2, pages 203–208, Newcastle, Australia, 1995. Modelling and Simulation Society of Australia.

[40] M.S. Bebbington. Parallel implementation of an iterative aggregation / disaggregation method for evaluating quasi-stationary behaviour in continuous-time Markov chains. *Parallel Computing*, 23:1545–1559, 1997.

[41] M.S. Bebbington and D.E. Stewart. An iterative aggregation / disaggregation procedure for modelling the long-term behaviour of continuous-time evanescent random processes. *J. Statist. Comput. Simulat.*, 56:77–95, 1996.

[42] N.G. Becker. A stochastic model for two interacting populations. *J. Appl. Probab.*, 7:544–564, 1970.

[43] N. Berglund and B. Gentz. On the noise-induced passage through an unstable periodic orbit II: General case. *SIAM J. Appl. Math.*, 46(1):310–352, 2014.

[44] N. Berglund and D. Landon. Mixed-mode oscillations and interspike interval statistics in the stochastic FitzHugh-Nagumo model. *Nonlinearity*, 25:2303–2335, 2012.

[45] J. Bertoin. Exponential decay and ergodicity of completely asymmetric Lévy processes in a finite interval. *Ann. Appl. Probab.*, 1:156–169, 1997.

[46] J. Bertoin and R.A. Doney. On conditioning a random walk to stay nonnegative. *Ann. Probab.*, 22:2152–2167, 1994.

[47] J. Bertoin and R.A. Doney. On conditioning random walks in an exponential family to stay nonnegative. In *Séminaire de Probabilités, XXVIII*, volume 1583 of *Lecture Notes in Math.*, pages 116–121. Springer, Berlin, 1994.

[48] J. Bertoin and R.A. Doney. Some asymptotic results for transient random walks. *Adv. Appl. Probab.*, 28:207–226, 1996.

[49] A. Bobrowski. Quasi-stationary distributions of a pair of Markov chains related to time evolution of a DNA locus. *Adv. Appl. Probab.*, 36:57–77, 2004.

[50] E. Bolthausen. On a functional central limit theorem for random walks conditioned to stay positive. *Ann. Probability*, 4:480–485, 1976.

[51] R.J. Boucherie. On the quasi-stationary distribution for queueing networks with defective routing. *J. Austral. Math. Soc. Ser. B*, 38:454–463, 1997.

[52] R.J. Boucherie and E.A. van Doorn. Uniformization for λ-positive Markov chains. Special issue in honor of Marcel F. Neuts. *Stochastic Models*, 14:171–186, 1998.

[53] L. Breyer, G.O. Roberts, and J.S. Rosenthal. A note on geometric ergodicity and floating-point roundoff error. *Statist. Probab. Lett.*, 53:123–127, 2001.

[54] L.A. Breyer. *Quasistationarity and conditioned Markov processes.* PhD thesis, Department of Mathematics, The University of Queensland, 1997.

[55] L.A. Breyer and A.G. Hart. Approximations of quasistationary distributions for Markov chains. In Richard J. Wilson, D.N. Pra Murthy, and Shunji Osaki, editors, *Proceedings of the 2nd Australia-Japan Workshop on Stochastic Models in Engineering, Technology and Management*, pages 81–90, The University of Queensland, 1996. Technology Management Centre.

[56] L.A. Breyer and A.G. Hart. Approximations of quasi-stationary distributions for Markov chains. *Math. Computer Modelling*, 31:69–79, 2000.

[57] L.A. Breyer and G.O. Roberts. A quasi-ergodic theorem for evanescent processes. *Stochastic Process. Appl.*, 84:177–186, 1999.

[58] P.J. Brockwell, J. Gani, and S.I. Resnick. Birth, immigration and catastrophe processes. *Adv. Appl. Probab.*, 14:709–731, 1982.

[59] M. Brown. Spectral analysis, without eigenvectors, for Markov chains. *Probab. Eng. Inf. Sci.*, 5:131–144, 1991.

[60] F.M. Buckley and P.K. Pollett. Analytical methods for a stochastic mainland-island metapopulation model. In R.S. Anderssen, R.D. Braddock, and L.T.H. Newham, editors, *Proceedings of the 18th World IMACS Congress and MODSIM09 International Congress on Modelling and Simulation*, pages 1767–1773, Canberra, Australia, 2009. Modelling and Simulation Society of Australia and New Zealand and International Association for Mathematics and Computers in Simulation.

[61] F.M. Buckley and P.K. Pollett. Limit theorems for discrete-time metapopulation models. *Probab. Surv.*, 7:53–83, 2010.

[62] M. Buiculescu. Quasi-stationary distributions for continuous-time Markov processes with a denumerable set of states. *Rev. Roum. Math. Pures et Appl.*, XVII:1013–1023, 1972.

[63] M. Buiculescu. Limiting conditional probabilities for denumerable Markov chains. In B. Bereanu, M. Iosifescu, T. Postelnicu, and P. Tăutu, editors, *Proceedings of the Fourth Conference on Probability Theory (Braşov, 1971)*, pages 121–128, Bucharest, 1973. Editura Academiei Republicii Socialiste Romnia.

[64] M. Buiculescu. On quasi-stationary distributions for multi-type Galton-Watson processes. *J. Appl. Probab.*, 12:60–68, 1975.

[65] M. Buiculescu. Ergodic properties of λ-recurrent Markov processes. *Stud. Cerc. Mat.*, 41:455–460, 1989.

[66] H. Callaert. Geometric and exponential decay in derived Markov chains. *J. Appl. Probab.*, 11:388–393, 1974.

[67] H. Callaert. On the rate of convergence in birth-and-death processes. *Bull. Soc. Math. Belg.*, 26:173–184, 1974.

[68] H. Callaert and J. Keilson. On exponential ergodicity and spectral structure for birth-death processes, I. *Stochastic Process. Appl.*, 1:187–216, 1973.

[69] H. Callaert and J. Keilson. On exponential ergodicity and spectral structure for birth-death processes, II. *Stochastic Process. Appl.*, 1:217–235, 1973.

[70] P. Cattiaux, P. Collet, A. Lambert, S. Martínez, S. Méléard, and J. San Martín. Quasi-stationary distributions and diffusion models in population dynamics. *Ann. Probab.*, 37(5):1926–1969, 2009.

[71] J.A. Cavender. Quasistationary distributions of birth-death processes. *Adv. Appl. Probab.*, 10:570–586, 1978.

[72] T. Chan. Large deviations and quasi-stationarity for density-dependent birth-death processes. *J. Austral. Math. Soc. Ser. B*, 40:238–256, 1998.

[73] T. Chan, P.K. Pollett, and M.C. Weinstein. Quantitative risk stratification in markov chains with limiting conditional distributions. *Medical Decision Making*, 29:532–540, 2009.

[74] M.F. Chen and D.W. Strook. λ_π-invariant measures. In *Séminaire de Probabilités XVII, Lecture Notes in Mathematics 986*, pages 205–220. Springer-Verlag, Berlin, 1983.

[75] C.K. Cheong. Geometric convergence of semi-Markov transition probabilities. *Z. Wahrsch. Verw. Gebiete*, 7:122–130, 1967.

[76] C.K. Cheong. Ergodic and ratio limit theorems for α-recurrent semi-Markov processes. *Z. Wahrsch. Verw. Gebiete*, 9:270–286, 1968.

[77] C.K. Cheong. Correction: Quasi-stationary distributions in semi-Markov processes. *J. Appl. Probab.*, 7:788, 1970.

[78] C.K. Cheong. Quasi-stationary distributions in semi-Markov processes. *J. Appl. Probab.*, 7:388–399, 1970.

[79] C.K. Cheong. Quasi-stationary distributions for the continuous-time Galton-Watson process. *Bull. Soc. Math. Belg.*, 24:343–350, 1972.

[80] D. Clancy and S.T. Mendy. Approximating the quasi-stationary distribution of the SIS model for endemic infection. *Methodol. Comput. Appl. Probab.*, 13:603–618, 2011.

[81] D. Clancy, P.D. O'Neill, and P.K. Pollett. Approximations for the long-term behaviour of an open-population epidemic model. *Methodology Comput. Appl. Probab.*, 3:75–95, 2001.

[82] D. Clancy and P.K. Pollett. A note on quasi-stationary distributions of birth-death processes and the sis logistic epidemic. *J. Appl. Probab.*, 40:821–825, 2003.

[83] C. Cocozza-Thivent and M. Roussignol. Comparaison des lois stationnaire et quasi-stationnaire d'un processus de Markov et application à la fiabilité. In *Séminaire de Probabilités, XXX*, volume 1626 of *Lecture Notes in Math.*, pages 24–39. Springer, Berlin, 1996.

[84] H. Cohn. A ratio limit theorem for the finite nonhomogeneous Markov chains. *Israel J. Math.*, 19:329–334, 1974.

[85] P. Collet, S. Martínez, S. Méléard, and J. San Martín. Quasi-stationary distributions for structured birth and death processes with mutations. *Probab. Theory Related Fields*, 151:191–231, 2011.

[86] P. Collet, S. Martínez, and J. San Martín. Asymptotic laws for one-dimensional diffusions conditioned to nonabsorption. *Ann. Probab.*, 23:1300–1314, 1995.

[87] P. Collet, S. Martínez, and J. San Martín. Ratio limit theorems for a Brownian motion killed at the boundary of a Benedicks domain. *Ann. Probab.*, 27:1160–1182, 1999.

[88] P. Collet, S. Martínez, and J. San Martín. *Quasi-stationary distributions*. Probability and its Applications (New York). Springer, Heidelberg, 2013. Markov chains, diffusions and dynamical systems.

[89] P. Collet, S. Martínez, and B. Schmitt. Quasi-stationary distribution and Gibbs measure of expanding systems. *Nonlinear Phenomena and Complex Systems*, 1:205–219, 1996.

[90] P. Coolen-Schrijner, A.G. Hart, and P.K. Pollett. Quasistationarity of continuous-time Markov chains with positive drift. *J. Austral. Math. Soc. Ser. B*, 41:423–441, 2000.

[91] P. Coolen-Schrijner and P.K. Pollett. Quasi-stationarity of discrete-time Markov chains with drift to infinity. *Methodology Comput. Appl. Probab.*, 1:81–96, 1999.

[92] P. Coolen-Schrijner and E.A. van Doorn. Quasi-stationary distributions for a class of discrete-time Markov chains. *Methodol. Comput. Appl. Probab.*, 8(4):449–465, 2006.

[93] P. Coolen-Schrijner and E.A. van Doorn. Quasi-stationary distributions for birth-death processes with killing. *J. Appl. Math. Stoch. Anal.*, pages Art. ID 84640, 15, 2006.

[94] N. Curien and Y. Peres. Random laminations and multitype branching processes. *Electron. Comm. Probab.*, 16:435–446, 2011.

[95] D.J. Daley. Quasi-stationary behaviour of a left-continuous random walk. *Ann. Math. Statist.*, 40:532–539, 1969.

[96] S. Dambrine and M. Moreau. Note on the stochastic theory of a self-catalytic chemical reaction, I. *Physica*, 106A:559–573, 1981.

[97] S. Dambrine and M. Moreau. Note on the stochastic theory of a self-catalytic chemical reaction, II. *Physica*, 106A:574–588, 1981.

[98] S.J. Darlington and P.K. Pollett. Quasistationarity in continuous-time Markov chains where absorption is not certain. *J. Appl. Probab.*, 37:598–600, 2000.

[99] J.N. Darroch and E. Seneta. On quasi-stationary distributions in absorbing discrete-time Markov chains. *J. Appl. Probab.*, 2:88–100, 1965.

[100] J.N. Darroch and E. Seneta. On quasi-stationary distributions in absorbing continuous-time finite Markov chains. *J. Appl. Probab.*, 4:192–196, 1967.

[101] J.R. Day. *Mathematical Models of Metapopulation Dynamics*. PhD thesis, Department of Applied Mathematics, The University of Adelaide, 1995.

[102] J.R. Day and H.P. Possingham. A stochastic metapopulation model with variable patch size and position. *Theoret. Pop. Biol.*, 48:333–360, 1995.

[103] M.M. de Oliveira and R. Dickman. Quasi-stationary distributions for models of heterogeneous catalysis. *Physica A: Statistical Mechanics and its Applications*, 343:525–542, 2004.

[104] M.M. de Oliveira and R. Dickman. How to simulate the quasistationary state. *Physical Review E*, 71:016129, 2005.

[105] M.M. de Oliveira and R. Dickman. Quasi-stationary simulation: the subcritical contact process. *Brazilian Journal of Physics*, 36:685–689, 2006.

[106] M.M. de Oliveira and S.C. Ferreira. Universality of the contact process with random dilution. *Journal of Statistical Mechanics: Theory and Experiment*, 2008:P11001, 2008.

[107] P. Diaconis and L. Miclo. On times to quasi-stationarity for birth and death processes. *J. Theoret. Probab.*, 22(3):558–586, 2009.

[108] R. Dickman and M.M. de Oliveira. Quasi-stationary simulation of the contact process. *Physica A: Statistical Mechanics and its Applications*, 357(1):134–141, 2005.

[109] R. Dickman and R. Vidigal. Quasi-stationary distributions for stochastic processes with an absorbing state. *J. Phys. A*, 35(5):1147–1166, 2002.

[110] R.A. Doney. A note on conditioned random walk. *J. Appl. Probab.*, 20:409–412, 1983.

[111] R.A. Doney. Conditional limit theorems for asymptotically stable random walks. *Z. Wahrsch. Verw. Gebiete*, 70:351–360, 1985.

[112] R.A. Doney. The Martin boundary and ratio limit theorems for killed random walks. *J. London Math. Soc.*, 58:761–768, 1998.

[113] M.I. Dykman, T. Horita, and J. Ross. Statistical distribution and stochastic resonance in periodically driven chemical-system. *J. Chem. Phys.*, 103:966–972, 1995.

[114] S. Elmes, P. Pollett, and D. Walker. μ-invariant measures and quasistationary distributions for continuous-time Markov chains when absorption is not certain. In Richard J. Wilson, D.N. Pra Murthy, and Shunji Osaki, editors, *Proceedings of the 2nd Australia-Japan Workshop on Stochastic Models in Engineering, Technology and Management*, pages 131–140, The University of Queensland, 1996. Technology Management Centre.

[115] S. Elmes, P. Pollett, and D. Walker. Further results on the relationship between μ-invariant measures and quasi-stationary distributions for absorbing continuous-time Markov chains. *Math. Computer Modelling*, 31:107–113, 2000.

[116] K. Enderle and H. Hering. Ratio limit theorems for branching Orstein Uhlenbeck processes. *Stochastic Process. Appl.*, 13:75–85, 1982.

[117] L.S. Evans. An upper bound for the mean of Yaglom's limit. *J. Appl. Probab.*, 15:199–201, 1978.

[118] W.J. Ewens. The diffusion equation and a pseudo-distribution in genetics. *J. Roy. Statist. Soc., Ser B*, 25:405–412, 1963.

[119] W.J. Ewens. The pseudo-transient distribution and its uses in genetics. *J. Appl. Probab.*, 1:141–156, 1964.

[120] I.I. Ezhov and V.N. Reshetnyak. A modification of the branching process. *Ukranian Math. J.*, 35:28–33, 1983.

[121] M. Faure and S.J. Schreiber. Quasi-stationary distributions for randomly perturbed dynamical systems. *Ann. Appl. Probab.*, 24:553–598, 2014.

[122] P.A. Ferrari. Quasi stationary distributions and Fleming-Viot processes. *Markov Process. Related Fields*, 19:491–495, 2013.

[123] P.A. Ferrari, H. Kesten, and S. Martínez. R-positivity, quasi-stationary distributions and ratio limit theorems for a class of probabilistic automata. *Ann. Appl. Probab.*, 6:577–616, 1996.

[124] P.A. Ferrari, H. Kesten, S. Martínez, and P. Picco. Existence of quasi-stationary distributions. A renewal dynamic approach. *Ann. Probab.*, 23:501–521, 1995.

[125] P.A. Ferrari and N. Lopes Garcia. One-dimensional loss networks and conditioned $M/G/\infty$ queues. *J. Appl. Probab.*, 35:963–975, 1998.

[126] P.A. Ferrari and N. Marić. Quasi stationary distributions and Fleming-Viot processes in countable spaces. *Electron. J. Probab.*, 12:no. 24, 684–702 (electronic), 2007.

[127] P.A. Ferrari and S. Martínez. Quasi-stationary distributions: continued fraction and chain sequence criteria for recurrence. *Resenhas*, 1:321–333, 1994.

[128] P.A. Ferrari, S. Martínez, and P. Picco. Some properties of quasi-stationary distributions in the birth-death chains: a dynamical approach. In *Instabilities and Non-Equilibrium Structures III*, pages 177–187. Kluwer, Dordrecht, 1991.

[129] P.A. Ferrari, S. Martínez, and P. Picco. Existence of nontrivial quasi-stationary distributions in the birth-death chain. *Adv. Appl. Probab.*, 24:795–813, 1992.

[130] P.A. Ferrari, S. Martínez, and J. San Martín. Phase transition for absorbed Brownian motion with drift. *J. Statist. Phys.*, 86:213–231, 1997.

[131] R. Fierro, S. Martínez, and J. San Martín. Limiting conditional and conditional invariant distributions for the Poisson process with negative drift. *J. Appl. Probab.*, 36:1194–1209, 1999.

[132] D.C. Flaspohler. Quasi-stationary distributions for absorbing continuous-time denumerable Markov chains. *Ann. Inst. Statist. Math.*, 26:351–356, 1974.

[133] D.C. Flaspohler and P.T. Holmes. Additional quasi-stationary distributions for semi-Markov processes. *J. Appl. Probab.*, 9:671–676, 1972.

[134] S.R. Foguel. Ratio limit theorems for Markov processes. *Israel J. Math.*, 7:384–392, 1969.

[135] S.R. Foguel and M. Lin. Some ratio limit theorems for Markov operators. *Z. Wahrscheinlichkeitstheorie und Verw. Gebiete*, 23:55–66, 1972.

[136] J.H. Folkman and S.C. Port. On Markov chains with the strong ratio limit property. *J. Math. Mech.*, 15:113–121, 1966.

[137] W.J. Gao and Y.H. Mao. Quasi-stationary distribution for the birth–death process with exit boundary. *J. Math. Anal. Appl.*, 427:114–125, 2015.

[138] Rodolphe Garbit. Brownian motion conditioned to stay in a cone. *J. Math. Kyoto Univ.*, 49(3):573–592, 2009.

[139] J. Geiger. A new proof of Yaglom's exponential limit law. In *Mathematics and computer science (Versailles, 2000)*, Trends Math., pages 245–249. Birkhäuser, Basel, 2000.

[140] P. Gerl. A ratio limit theorem. In *Conference on Random Walks (Kleebach, 1979) (French)*, volume 74 of *Astérisque*, pages 7–14. Soc. Math. France, Paris, 1980.

[141] R.J. Gibbens, P.J. Hunt, and F.P. Kelly. Bistability in communications networks. In G.R. Grimmett and D.J.A. Welsh, editors, *Disorder in Physical Systems*, pages 113–127. Oxford University Press, Oxford, 1990.

[142] D. Gibson and E. Seneta. Augmented truncations of infinite stochastic matrices. *J. Appl. Probab.*, 24:600–608, 1987.

[143] D. Gibson and E. Seneta. Monotone infinite stochastic matrices and their augmented truncations. *Stochastic Process. Appl.*, 24:287–292, 1987.

[144] M.E. Gilpin and I. Hanski. *Metapopulation Dynamics.* Academic Press, New York, 1991.

[145] M.E. Gilpin and B.L. Taylor. Reduced dimensional population transition matrices: extinction distributions from Markovian dynamics. *Theoret. Pop. Biol.*, 46:121–130, 1994.

[146] E. Giné, V. Koltchinskii, and J.A. Wellner. Ratio limit theorems for empirical processes. In *Stochastic inequalities and applications*, volume 56 of *Progr. Probab.*, pages 249–278. Birkhäuser, Basel, 2003.

[147] J. Glover. Quasistationary distributions, eigenmeasures, and eigenfunctions of Markov processes. *Progr. Probab. Statist.*, 9:71–98, 1986.

[148] P.W. Glynn and H. Thorisson. Two-sided taboo limits for Markov processes and associated perfect simulation. *Stochastic Process. Appl.*, 91(1):1–20, 2001.

[149] P.W. Glynn and H. Thorisson. Structural characterization of taboo-stationarity for general processes in two-sided time. *Stochastic Process. Appl.*, 102(2):311–318, 2002.

[150] P. Good. The limiting behaviour of transient birth and death processes conditioned on survival. *J. Austral. Math. Soc. Ser. B*, 8:716–722, 1968.

[151] F. Gosselin. Reconciling theoretical approaches to stochastic patch-occupancy metapopulation models. *Bull. Math. Biol.*, 60:955–971, 1998.

[152] F. Gosselin. Asymptotic behavior of absorbing Markov chains conditional on non-absorption for applications in conservation biology. *Ann. Appl. Probab.*, 11:261–284, 2001.

[153] J. Grasman. The expected extinction time of a population within a system of interacting biological populations. *Bull. Math. Biol.*, 58:555–568, 1996.

[154] B. Gray, P.K. Pollett, and H.J. Zhang. On the existence of uni-instantaneous Q-processes with a given finite μ-invariant measure. *J. Appl. Probab.*, 42:713–725, 2005.

[155] P.J. Green. Generalizing the Yaglom limit theorems. In *Recent developments in statistics (Proc. European Meeting Statisticians, Grenoble, 1976)*, pages 441–444. North-Holland, Amsterdam, 1977.

[156] P. Groisman and M. Jonckheere. Simulation of quasi-stationary distributions on countable spaces. *Markov Process. Related Fields*, 19:521–542, 2013.

[157] G. Guo and W. Zhao. Schwarz methods for quasi stationary distributions of Markov chains. *Calcolo*, 49:21–39, 2012.

[158] M. Gyllenberg and D.S. Silvestrov. Quasi-stationary distributions of a stochastic metapopulation model. *J. Math. Biol.*, 33:35–70, 1994.

[159] M. Gyllenberg and D.S. Silvestrov. Quasi-stationary phenomena for semi-Markov processes. In *Semi-Markov models and applications (Compiègne, 1998)*, pages 33–60. Kluwer Acad. Publ., Dordrecht, 1999.

[160] M. Gyllenberg and D.S. Silvestrov. Nonlinearly perturbed regenerative processes and pseudo-stationary phenomena for stochastic systems. *Stochastic Process. Appl.*, 86:1–27, 2000.

[161] M. Gyllenberg and D.S. Silvestrov. *Quasi-stationary phenomena in nonlinearly perturbed stochastic systems*, volume 44 of *de Gruyter Expositions in Mathematics*. Walter de Gruyter GmbH & Co. KG, Berlin, 2008.

[162] B. Haas and V. Rivero. Quasi-stationary distributions and Yaglom limits of self-similar Markov processes. *Stochastic Process. Appl.*, 122:4054–4095, 2012.

[163] D.E. Handelman. Eigenvectors and ratio limit theorems for Markov chains and their relatives. *J. Anal. Math.*, 78:61–116, 1999.

[164] F.B. Hanson and H.C. Tuckwell. Persistence times of populations with large random fluctuations. *Theoret. Pop. Biol.*, 14:46–61, 1978.

[165] F.B. Hanson and H.C. Tuckwell. Logistic growth with random density independent disasters. *Theoret. Pop. Biol.*, 19:1–18, 1981.

[166] A.G. Hart. *Quasistationary distributions for continuous-time Markov chains*. PhD thesis, Department of Mathematics, The University of Queensland, 1997.

[167] A.G. Hart, S. Martínez, and J. San Martín. The λ-classification of continuous-time birth-and-death processes. *Adv. Appl. Probab.*, 35:1111–1130, 2003.

[168] A.G. Hart and P.K. Pollett. Direct analytical methods for determining quasistationary distributions for continuous-time Markov chains. In C.C. Heyde, Yu.V. Prohorov, R. Pyke, and S.T. Rachev, editors, *Athens Conference on Applied Probability and Time Series Analysis, Volume I: Applied Probability, In Honour of J.M. Gani, Lecture Notes in Statistics 114*, pages 116–126. Springer-Verlag, New York, 1996.

[169] A.G. Hart and P.K. Pollett. New methods for determining quasistationary distributions for Markov chains. In Richard J. Wilson, D.N. Pra Murthy, and Shunji Osaki, editors, *Proceedings of the 2nd Australia-Japan Workshop on Stochastic Models in Engineering, Technology and Management*, pages 177–186, The University of Queensland, 1996. Technology Management Centre.

[170] A.G. Hart and P.K. Pollett. New methods for determining quasi-stationary distributions for Markov chains. *Math. Computer Modelling*, 31:143–150, 2000.

[171] A.G. Hart and R.L Tweedie. Convergence of invariant measures of truncation approximations to Markov processes. Submitted for publication, 1999.

[172] C.R. Heathcote, E. Seneta, and D. Vere-Jones. A refinement of two theorems in the theory of branching processes. *Teor. Verojatnost. i Primenen.*, 12:341–346, 1967.

[173] C.M. Hernández-Suárez and C. Castillo-Chavez. An application of queuing theory to SIS and SEIS epidemic models. *Math. Biosci. Eng.*, 7:809–823, 2010.

[174] G. Högnäs. On the quasi-stationary distribution of a stochastic Ricker model. *Stochastic Process. Appl.*, 70:243–263, 1997.

[175] C.S. Holling. Resilience and stability of ecological systems. *Ann. Rev. Ecol. Systematics*, 4:1–23, 1973.

[176] L.Y. Hou. Ratio limit for transient Markov chains. *Natur. Sci. J. Harbin Normal Univ.*, 19:23–25, 2003.

[177] E.A. Housworth. Escape rate for 2-dimensional Brownian motion conditioned to be transient with application to Zygmund functions. *Trans. Amer. Math. Soc.*, 343:843–852, 1994.

[178] W. Huisinga, S. Meyn, and C. Schütte. Phase transitions and metastability in Markovian and molecular systems. *Ann. Appl. Probab.*, 14(1):419–458, 2004.

[179] D.L. Iglehart. Functional central limit theorems for random walks conditioned to stay positive. *Ann. Probab.*, 2:608–619, 1974.

[180] D.L. Iglehart. Random walks with negative drift conditioned to stay positive. *J. Appl. Probab.*, 11:742–751, 1974.

[181] R. Isaac. On the ratio-limit theorem for Markov processes recurrent in the sense of Harris. *Illinois J. Math.*, 11:608–615, 1967.

[182] R. Isaac. Asymptotic independence and individual ratio limit theorems. *Z. Wahrsch. Verw. Gebiete*, 62:201–214, 1983.

[183] D. Isaacson. A characterization of geometric ergodicity. *Z. Wahrsch. Verw. Gebiete*, 49:267–273, 1979.

[184] S.D. Jacka and G.O. Roberts. Conditional diffusions: their infinitesimal generators and limit laws. Preprint, University of Warwick, 1988.

[185] S.D. Jacka and G.O. Roberts. Weak convergence of conditioned processes on a countable state space. *J. Appl. Probab.*, 32:902–916, 1995.

[186] S.D. Jacka and G.O. Roberts. Conditional one-dimensional diffusions. Preprint, University of Cambridge, 1996.

[187] S. Kalpakam and M.A. Shahul Hameed. Quasi-stationary distribution of a two-unit warm-standby redundant system. *J. Appl. Probab.*, 20:429–435, 1983.

[188] S. Kang and J. Klotz. Limiting conditional distribution for tests of independence in the two way table. *Comm. Statist. Theory Methods*, 27(8):2075–2082, 1998.

[189] P. Kao. Limiting diffusion for random walks with drift conditioned to stay positive. *J. Appl. Probab.*, 15:280–291, 1978.

[190] R.W. Keener. Limit theorems for random walks conditioned to stay positive. *Ann. Probab.*, 20:801–824, 1992.

[191] J. Keilson and R. Ramaswamy. Convergence of quasistationary distributions in birth-death processes. *Stochastic Process. Appl.*, 18:301–312, 1984.

[192] J. Keilson and R. Ramaswamy. The bivariate maximum process and quasi-stationary structure of birth-death processes. *Stochastic Process. Appl.*, 22:27–36, 1986.

[193] F.P. Kelly. Invariant measures and the q-matrix. In J.F.C. Kingman and G.E.H. Reuter, editors, *Probability, Statistics and Analysis*, London Mathematical Society Lecture Notes Series 79, pages 143–160. Cambridge University Press, Cambridge, UK, 1983.

[194] F.P. Kelly. Stochastic models of computer communication systems. *J. Roy. Statist. Soc., Ser B*, 47:379–395, 415–428, 1985. With discussion.

[195] F.P. Kelly. One-dimensional circuit-switched networks. *Ann. Probab.*, 15:1166–1179, 1987.

[196] D.G. Kendall. Contribution to discussion on 'quasi-stationary distributions and time-reversion in genetics' by e.seneta [with discussion]. *J. Roy. Statist. Soc., Ser B*, 28:253–277, 1966.

[197] D.P. Kennedy. Limiting diffusions for the conditioned M/G/1 queue. *J. Appl. Probab.*, 11:355–362, 1974.

[198] G. Kersting. Strong ratio limit property and R-recurrence of reversible Markov chains. *Z. Wahrsch. Verw. Gebiete*, 30:343–356, 1974.

[199] H. Kesten. A ratio limit theorem for symmetric random walk. *J. Analyse Math.*, 23:199–213, 1970.

[200] H. Kesten. Review of good (1968). *Math. Rev.*, 39:410, 1970.

[201] H. Kesten. A ratio limit theorem for (sub) Markov chains on $\{1, 2, \ldots\}$ with bounded jumps. *Adv. Appl. Probab.*, 27:652–691, 1995.

[202] R.Z. Khasminskii, G. Yin, and Q. Zhang. Singularly perturbed Markov chains: quasi-stationary distribution and asymptotic expansion. In G.S. Ladde and M. Sambandham, editors, *Proceedings of Dynamic Systems and Applications*, pages 301–308, Atlanta Georgia, USA, 1996. Dynamic Publishers, Inc.

[203] A.A. Kibkalo. Quasistationary regime in queueing systems of type $M(t)|D|1|\infty$. *Vestnik Moskov. Univ. Ser. I Mat. Mekh.*, 5:41–44, 96, 1985.

[204] M. Kijima. Correction: On the existence of quasi-stationary distributions in denumerable R-transient Markov chains. *J. Appl. Probab.*, 30:496, 1992.

[205] M. Kijima. Evaluation of the decay parameter for some specialized birth-death processes. *J. Appl. Probab.*, 29:781–791, 1992.

[206] M. Kijima. On the existence of quasi-stationary distributions in denumerable R-transient Markov chains. *J. Appl. Probab.*, 29:21–36, 1992.

[207] M. Kijima. Bounds for the quasi-stationary distribution of some specialized Markov chains. In S. Osaki and D.N.P. Murthy, editors, *Proceedings of the Australia-Japan Workshop on Stochastic Models in Engineering, Technology and Management*, pages 262–268, Singapore, 1993. World Scientific.

[208] M. Kijima. Quasi-limiting distributions of Markov chains that are skip-free to the left in continuous-time. *J. Appl. Probab.*, 30:509–517, 1993.

[209] M. Kijima. Quasi-stationary distributions of single-server phase-type queues. *Math. Operat. Res.*, 18:423–437, 1993.

[210] M. Kijima. Bounds for the quasi-stationary distribution of some specialized Markov chains. *Math. Computer Modelling*, 22:141–147, 1995.

[211] M. Kijima. *Markov Processes for Stochastic Modeling.* Chapman & Hall, London, 1997.

[212] M. Kijima and N. Makimoto. Quasi-stationary distributions of Markov chains arising from queueing processes: a survey. In *Applied probability and stochastic processes*, volume 19 of *Internat. Ser. Oper. Res. Management Sci.*, pages 277–311. Kluwer Acad. Publ., Boston, MA, 1999.

[213] M. Kijima and Makimoto. N. Computation of the quasi-stationary distributions in M(n)/GI/1/K and GI/M(n)/1/K queues. *Queuing Systems Theory Appl.*, 11:255–272, 1992.

[214] M. Kijima and Makimoto. N. Computation of quasi-stationary distributions in Markovian queues. In HELP, editor, *Proceedings of the 16th International Conference on Computers and Industrial Engineering*, pages 849–852, HELP, 1994. HELP.

[215] M. Kijima and Makimoto. N. Quasi-stationary distributions of Markov chains arising from queueing processes: a survey. In HELP, editor, *Research Reports on Mathematical and Computer Sciences, Series B: Operations Research.* Department of Mathematical and Computer Sciences, Tokyo Institute of Technology, 1994. B-304.

[216] M. Kijima, M.G. Nair, P.K. Pollett, and E.A. van Doorn. Limiting conditional distributions for birth-death processes. *Adv. Appl. Probab.*, 29:185–204, 1997.

[217] M. Kijima and E. Seneta. Some results for quasistationary distributions of birth-death processes. *J. Appl. Probab.*, 28:503–511, 1991.

[218] M. Kijima and E.A. van Doorn. Weighted sums of orthogonal polynomials with positive zeros. *J. Comput. Appl. Math.*, 65:195–206, 1995.

[219] M. Kimmel. Quasistationarity in a branching model of division-within-division. In *Classical and Modern Branching Processes (Minneapolis, MN, 1994)*, pages 157–164. Springer, New York, 1997.

[220] J.F.C. Kingman. Ergodic properties of continuous-time Markov processes and their discrete skeletons. *Proc. London Math. Soc.*, 13:593–604, 1963.

[221] J.F.C. Kingman. The exponential decay of Markov transition probabilities. *Proc. London Math. Soc.*, 13:337–358, 1963.

[222] J.F.C. Kingman and S. Orey. Ratio limit theorems for Markov chains. *Proc. Amer. Math. Soc.*, 15:907–910, 1964.

[223] M. Klass and J. Pitman. Limit laws for Brownian motion conditioned to reach a high level. *Statist. Probab. Lett.*, 17:13–17, 1993.

[224] F. Klebaner and J. Lazar. On the quasi-stationary distribution in randomly perturbed dynamical systems with a single attracting point. In Richard J. Wilson, D.N. Pra Murthy, and Shunji Osaki, editors, *Proceedings of the 2nd Australia-Japan Workshop on Stochastic Models in Engineering, Technology and Management*, pages 348–354, The University of Queensland, 1996. Technology Management Centre.

[225] F. Klebaner, J. Lazar, and O. Zeitouni. On the quasi-stationary distribution for some randomly perturbed transformations of an interval. *Ann. Appl. Probab.*, 8:300–315, 1998.

[226] D.R. Klein. The introduction, increase, and crash of reindeer on St. Matthew Island. *J. Wildlife Man.*, 32:351–367, 1968.

[227] S. Knoth. Quasi-stationarity of CUSUM schemes for Erlang distributions. *Metrika*, 48:31–48, 1998.

[228] V.V. Kukhtin, N.V. Kuzmenko, and O.V. Shramko. Green light as a possible pressing factor for oceanic phytoplankton near the base of the euphotic zone. *J. Theor. Biol.*, 188:319–322, 1997.

[229] R. Kulik and P. Soulier. Estimation of limiting conditional distributions for the heavy tailed long memory stochastic volatility process. *Extremes*, 16:203–239, 2013.

[230] T.G. Kurtz. Solutions of ordinary differential equations as limits of pure jump Markov processes. *J. Appl. Probab.*, 7:49–58, 1970.

[231] T.G. Kurtz. Limit theorems for sequences of jump Markov processes approximating ordinary differential processes. *J. Appl. Probab.*, 8:344–356, 1971.

[232] T.G. Kurtz. The relationship between stochastic and deterministic models in chemical reactions. *J. Chem. Phys.*, 57:2976–2978, 1972.

[233] T.G. Kurtz. Limit theorems and diffusion approximations for density dependent Markov chains. *Math. Prog. Study*, 5:67–78, 1976.

[234] T.G. Kurtz. Strong approximation theorems for density dependent Markov chains. *Stochastic Process. Appl.*, 6:223–240, 1978.

[235] T.G. Kurtz and S. Wainger. The nonexistence of the Yaglom limit for an age dependent subcritical branching process. *Ann. Probab.*, 1:857–861, 1973.

[236] A.E. Kyprianou and Z. Palmowski. Quasi-stationary distributions for Lévy processes. *Bernoulli*, 12(4):571–581, 2006.

[237] E.K. Kyprianou. On the quasi-stationary distribution of the virtual waiting time in queues with poisson arrivals. *J. Appl. Probab.*, 8:494–507, 1971.

[238] E.K. Kyprianou. On the quasi-stationary distributions of the GI/M/1 queues. *J. Appl. Probab.*, 9:117–128, 1972.

[239] E.K. Kyprianou. The quasi-stationary distributions of queues in heavy traffic. *J. Appl. Probab.*, 9:821–831, 1972.

[240] C. Labbé. Quasi-stationary distributions associated with explosive CSBP. *Electron. Commun. Probab.*, 18:no. 57, 13, 2013.

[241] C.W. Lamb. A ratio limit theorem for approximate martingales. *Canad. J. Math.*, 25:772–779, 1973.

[242] A. Lambert. Completely asymmetric Lévy processes confined in a finite interval. *Ann. Inst. H. Poincaré Probab. Statist.*, 36(2):251–274, 2000.

[243] A. Lambert. Quasi-stationary distributions and the continuous-state branching process conditioned to be never extinct. *Electron. J. Probab.*, 12:no. 14, 420–446 (electronic), 2007.

[244] A. Lambert. Population dynamics and random genealogies. *Stochastic Models*, 24:45–163, 2008.

[245] A. Lambert. Population genetics, ecology and the size of populations. *J. Math. Biol.*, 60:469–472, 2010.

[246] D. Landon. *Perturbation et excitabilité dans des modèles stochastiques de transmission de l'influx nerveux*. PhD thesis, Laboratoire de Mathématiques - Analyse, Probabilités, Modèlisation, Université D'Orléans, 2012.

[247] J.B. Lasserre and C.E.M. Pearce. On the existence of a quasistationary measure for a Markov chain. *Ann. Probab.*, 29:437–446, 2001.

[248] W. Ledermann and G.E.H. Reuter. Spectral theory for the differential equations of simple birth and death processes. *Phil. Trans. R. Soc. London*, 246:321–369, 1954.

[249] J. Ledoux. On weak lumpability of denumerable Markov-chains. *Statist. Probab. Lett.*, 25:329–339, 1995.

[250] J. Ledoux, G. Rubino, and B. Sericola. Exact aggregation of absorbing Markov processes using the quasi-stationary distribution. *J. Appl. Probab.*, 31:626–634, 1994.

[251] R. Levins. Extinction. In M. Gerstenhaber, editor, *Some Mathematical Questions in Biology*, pages 75–107. American Mathematical Society, Providence, RI, USA, 1970.

[252] M.L. Levitan. A generalized Doeblin ratio limit theorem. *Ann. Math. Statist.*, 42:904–911, 1971.

[253] Quan-Lin Li. *Constructive computation in stochastic models with applications*. Tsinghua University Press, Beijing, 2010. The *RG*-factorization.

[254] Quan-Lin Li and Yiqiang Zhao. A constructive method for finding β-invariant measures for transition matrices of $M/G/1$ type. In *Matrix-analytic methods (Adelaide, 2002)*, pages 237–263. World Sci. Publ., River Edge, NJ, 2002.

[255] Quan-Lin Li and Yiqiang Q. Zhao. β-invariant measures for transition matrices of $GI/M/1$ type. *Stoch. Models*, 19:201–233, 2003.

[256] S.X. Li and G.N. Xiao. Determination of μ-invariant measure from the Q-resolvent function. *Math. Theory Appl. (Changsha)*, 21:30–32, 2001.

[257] X. Li, G. Yin, K. Yin, and Q. Zhang. A numerical study of singularly perturbed Markov chains: quasi-equilibrium distributions and scaled occupation measures. *Dynam. Contin. Discrete Impuls. Systems*, 5:295–304, 1999.

[258] Y. Li and J. Li. Criteria for Feller transition functions. *J. Math. Anal. Appl.*, 359:653–665, 2009.

[259] M. Lin. Mixed ratio limit theorems for Markov processes. *Israel J. Math.*, 8:357–366, 1970.

[260] M. Lin. Strong ratio limit theorems for Markov processes. *Ann. Math. Statist.*, 43:569–579, 1972.

[261] M. Lin. Strong ratio limit theorems for mixing Markov operators. *Ann. Inst. H. Poincaré Sect. B (N.S.)*, 12:181–191, 1976.

[262] X. Lin, H.J. Zhang, and Z.T. Hou. The μ-invariant distribution of a Q-process. *Acta Math. Appl. Sin.*, 25:694–703, 2002.

[263] Y. Liu, H. Zhang, and Y. Zhao. Computable strongly ergodic rates of convergence for continuous-time Markov chains. *ANZIAM J.*, 49(4):463–478, 2008.

[264] M. Lladser and J. San Martín. Domain of attraction of the quasi-stationary distributions for the Ornstein-Uhlenbeck process. *J. Appl. Probab.*, 37:511–520, 2000.

[265] N. Makimoto. Quasi-stationary distributions in a PH/PH/c queue. *Stochastic Models*, 9:195–212, 1993.

[266] M. Malek-Mansour and G. Nicolis. A master equation description of local fluctuation. *J. Statist. Phys.*, 13:197–217, 1975.

[267] P. Mandl. On the asymptotic behaviour of probabilities within groups of states of a homogeneous Markov processs (in Czech.). *Časopis Pěst. Mat.*, 85:448–456, 1960.

[268] P. Mandl. An elementary proof of the ergodic property of birth and death processes (in Czech.). *Časopis Pěst. Mat.*, 89:354–358, 1964.

[269] S. Martínez. Quasi-stationary distributions for birth-death chains: convergence radii and Yaglom limit. *NATO Adv. Sci. Inst. Ser. C Math. Phys. Sci.*, 396:491–505, 1993.

[270] S. Martínez. Notes and a remark on quasi-stationary distributions. In *Pyrenees International Workshop on Statistics, Probability and Operations Research: SPO 2007*, volume 34 of *Monogr. Semin. Mat. García Galdeano*, pages 61–80. Prensas Univ. Zaragoza, Zaragoza, 2008.

[271] S. Martínez, P. Picco, and J. San Martín. Domain of attraction of quasi-stationary distributions for the Brownian motion with drift. *Adv. Appl. Probab.*, 30:385–408, 1998.

[272] S. Martínez and J. San Martín. Quasi-stationary distributions for a Brownian motion with drift and associated limit laws. *J. Appl. Probab.*, 31:911–920, 1994.

[273] S. Martínez and J. San Martín. Some properties of quasi-stationary distributions for finite Markov chains. In *Surveys in stochastic processes*, EMS Ser. Congr. Rep., pages 59–66. Eur. Math. Soc., Zürich, 2011.

[274] S. Martínez and M.E. Vares. A Markov chain associated with the minimal quasi-stationary distribution of birth-death chains. *J. Appl. Probab.*, 32:25–38, 1995.

[275] J. Martins, A. Pinto, and N. Stollenwerk. Stationarity in moment closure and quasi-stationarity of the SIS model. *Math. Biosci.*, 236:126–131, 2012.

[276] R.M. May. *Stability and Complexity in Model Ecosystems.* Princeton University Press, Princeton, 2nd edition, 1974.

[277] D.R. McNeil and S. Schach. Central limit analogues for Markov population processes. *J. Roy. Statist. Soc. Ser. B*, 35:1–23, 1973. With a discussion by J. F. C. Kingman, M. S. Bartlett, A. D. Barbour, D. R. Cox, D. G. Kendall and V. Barnett, and replies by S. Schach and D. R. McNeil.

[278] L.D. Mech. The wolves of Ilse Royale. *Fauna of the National Parks: U.S. Fauna Series*, 7, 1966.

[279] Q.X. Mei and X. Lin. The relationship between μ-invariant distribution and quasi-stationary distributions for continuous-time Markov chains. *Math. Theory Appl. (Changsha)*, 21:26–29, 2001.

[280] S. Méléard and D. Villemonais. Quasi-stationary distributions and population processes. *Probab. Surv.*, 9:340–410, 2012.

[281] Y. Miura. Ultracontractivity for Markov semigroups and quasi-stationary distributions. *Stoch. Anal. Appl.*, 32:591–601, 2014.

[282] J.A. Moler, F. Plo, and M. San Miguel. Minimal quasi-stationary distributions under null R-recurrence. *Test*, 9:455–470, 2000.

[283] F. Móricz. The strong laws of large numbers for quasi-stationary sequences. *Z. Wahrscheinlichkeitstheorie und Verw. Gebiete*, 38:223–236, 1977.

[284] F. Móricz. Strong laws of large numbers for quasistationary random fields. *Z. Wahrsch. Verw. Gebiete*, 51:249–268, 1980.

[285] A.G. Mucci. Ratio limit theorems. *Canad. J. Math.*, 28:403–407, 1976.

[286] M.G. Nair and P.K. Pollett. Correction: "On the relationship between μ-invariant measures and quasi-stationary distributions for continuous-time Markov chains". *Adv. in Appl. Probab.*, 25:717–719, 1993.

[287] M.G. Nair and P.K. Pollett. On the relationship between μ-invariant measures and quasistationary distributions for continuous-time Markov chains. *Adv. Appl. Probab.*, 25:82–102, 1993.

[288] S.M. Narimanjan. A ratio limit theorem for random walk on groups. *Vestnik Moskov. Univ. Ser. I Mat. Meh.*, 30:17–24, 1975.

[289] I. Nåsell. On the quasistationary distribution of the Ross Malaria model. *Math. Biosci.*, 107:187–208, 1991.

[290] I. Nåsell. The quasi-stationary distribution of the closed endemic SIS model. *Adv. Appl. Probab.*, 28:895–932, 1996.

[291] I. Nåsell. Ross's Malaria model and qualitative theory (in Swedish). *Normat*, 46:1–13, 1998.

[292] I. Nåsell. On the quasi-stationary distribution of the stochastic logistic epidemic. *Math. Biosci.*, 156:21–40, 1999.

[293] I. Nåsell. On the time to extinction in recurrent epidemics. *J. Roy. Statist. Soc., Ser B*, 61:309–330, 1999.

[294] I. Nåsell. A new look at the critical community size for childhood infections. *Theoret. Pop. Biol.*, 67:203–216, 2005.

[295] I. Nåsell. *Extinction and quasi-stationarity in the stochastic logistic SIS model*, volume 2022 of *Lecture Notes in Mathematics*. Springer, Heidelberg, 2011. Mathematical Biosciences Subseries.

[296] E. Nummelin. Limit theorems for α-recurrent semi-Markov processes. *Adv. Appl. Probab.*, 8:531–547, 1976.

[297] E. Nummelin. On the concepts of α-recurrence and α-transience for Markov renewal processes. *Stochastic Process. Appl.*, 5:1–19, 1977.

[298] E. Nummelin. Uniform and ratio limit theorems for Markov renewal and semi-regenerative processes on a general state space. *Ann. Inst. H. Poincaré Sect. B (N.S.)*, 14:119–143, 1978.

[299] E. Nummelin. Strong ratio limit theorems for φ-recurrent Markov chains. *Ann. Probab.*, 7:639–650, 1979.

[300] E. Nummelin and E. Arjas. A direct construction of the R-invariant measure for a Markov chain on a general state space. *Ann. Probab.*, 4:674–679, 1976.

[301] E. Nummelin and Tweedie R.L. Geometric ergodicity and R-positivity for general Markov chains. *Ann. Probab.*, 6:404–420, 1978.

[302] S.D. Oman. A ratio limit theorem for subterminal times. *Ann. Probab.*, 5:262–277, 1977.

[303] S.D. Oman. Ratio limit theorems for hitting times and hitting places. *Indiana Univ. Math. J.*, 27:657–670, 1978.

[304] P.D. O'Neill. Constructing population processes with specified quasi-stationary distributions. *Stoch. Models*, 23(3):439–449, 2007.

[305] I. Oppenheim, K.K. Schuler, and G.H. Weiss. Stochastic theory of nonlinear rate processes with multiple stationary states. *Physica*, 88A:191–214, 1977.

[306] S. Orey. Strong ratio limit property. *Bull. Amer. Math. Soc.*, 67:571–574, 1961.

[307] Y. Oshima. Certain ratio limit theorem for time inhomogeneous Markov chains. In *Stochastic processes, physics and geometry: new interplays, II (Leipzig, 1999)*, volume 29 of *CMS Conf. Proc.*, pages 533–537. Amer. Math. Soc., Providence, RI, 2000.

[308] O. Ovaskainen. The quasistationary distribution of the stochastic logistic model. *J. Appl. Probab.*, 38:898–907, 2001.

[309] A.G. Pakes. Conditional limit theorems for a left continuous random walk. *J. Appl. Probab.*, 10:317–329, 1973.

[310] A.G. Pakes. On Markov branching processes with immigration. *Sankhyā*, A37:129–138, 1975.

[311] A.G. Pakes. Limit theorems for the population size of a birth and death process allowing catastrophes. *J. Math. Biol.*, 25:307–325, 1987.

[312] A.G. Pakes. Absorbing Markov and branching processes with instantaneous resurrection. *Stochastic Process. Appl.*, 48:85–106, 1993.

[313] A.G. Pakes. Explosive Markov branching processes: entrance laws and limiting behaviour. *Adv. Appl. Probab.*, 25:737–756, 1993.

[314] A.G. Pakes. Quasi-stationary laws for Markov processes: examples of an always proximate absorbing state. *Adv. Appl. Probab.*, 27:120–145, 1995.

[315] A.G. Pakes. Killing and resurrection of Markov processes. *Stochastic Models*, 13:255–269, 1997.

[316] A.G. Pakes. On the recognition and structure of probability generating functions. In *Classical and Modern Branching Processes (Minneapolis, MN, 1994)*, pages 263–284. Springer, New York, 1997.

[317] A.G. Pakes and P.K. Pollett. The supercritical birth, death and catastrophe process: Limit theorems on the set of extinction. *Stochastic Process. Appl.*, 32:161–170, 1989.

[318] A.G. Pakes, A.C. Trajstman, and P.J. Brockwell. A stochastic model for a replicating population subject to mass emigration due to population pressure. *Math. Biosci.*, 45:137–157, 1979.

[319] F. Papangelou. Strong ratio limits, R-recurrence and mixing properties of discrete parameter Markov processes. *Z. Wahrsch. Verw. Gebiete*, 8:259–297, 1967.

[320] R.W. Parsons. *Mathematical models of chemical reactions*. PhD thesis, Department of Mathematical Statistics and Operational Research, University College of Cardiff, The University of Wales, 1985.

[321] R.W. Parsons and P.K. Pollett. Quasistationary distributions for some autocatalytic reactions. *J. Statist. Phys.*, 46:249–254, 1987.

[322] P.R. Parthasarathy, R.B. Lenin, W. Schoutens, and W. van Assche. A birth and death process related to the Rogers-Ramanujan continued fraction. *J. Math. Anal. Appl.*, 224:297–315, 1998.

[323] C.E.M. Pearce and Y.W. Shin. An algorithmic approach to the Markov chain with transition probability matrix of upper block-hessenberg form. *Korean Journal of Computational and Applied Mathematics*, 5:403–426, 1998.

[324] E. Pearce. Determining a quasistationary distribution for a block process. In A. Alfa and S. Chakravarthy, editors, *Advances in Matrix Analytic Methods for Stochastic Models*, pages 55–66. Notable Publications, New Jersey, USA, 1998.

[325] N.F. Peng. Spectral representations of the transition probability matrices for continuous-time finite Markov chains. *J. Appl. Probab.*, 33:28–33, 1996.

[326] K. Petersen and K. Schmidt. Symmetric Gibbs measures. *Trans. Amer. Math. Soc.*, 349:2775–2811, 1997.

[327] M. Petersson. Quasi-stationary distributions for perturbed discrete time regenerative processes. *Teor. Ĭmovīr. Mat. Stat.*, 89:140–155, 2013.

[328] M. Pijnenburg and N. Ravichandran. Quasi-stationary distribution of a two-unit dependent parallel system. Technical Report, Eindhoven University of Technology, 1990.

[329] M. Pijnenburg, N. Ravichandran, and G. Regterschot. Stochastic analysis of a dependent parallel system. Technical Report, Eindhoven University of Technology, 1990.

[330] R.G. Pinsky. On the convergence of diffusion processes conditioned to remain in a bounded region for a large time to limiting positive recurrent diffusion processes. *Ann. Probab.*, 13:363–378, 1985.

[331] R.G. Pinsky. A new approach to the Martin boundary via diffusions conditioned to hit a compact set. *Ann. Probab.*, 21:453–481, 1993.

[332] M. Polak and T. Rolski. A note on speed of convergence to the quasi-stationary distribution. *Demonstratio Math.*, 45:385–397, 2012.

[333] M. Pollak and D. Siegmund. Convergence of quasi-stationary to stationary distributions for stochastically monotone Markov processes. *J. Appl. Probab.*, 23:215–220, 1986.

[334] D. Pollard. Uniform ratio limit theorems for empirical processes. *Scand. J. Statist.*, 22:271–278, 1995.

[335] D.B. Pollard and R.L. Tweedie. R-theory for Markov chains on a topological space, i. *J. London Math. Soc.*, 10:389–400, 1975.

[336] D.B. Pollard and R.L. Tweedie. R-theory for Markov chains on a topological space, ii. *Z. Wahrsch. Verw. Gebiete*, 34:269–278, 1976.

[337] P.K. Pollett. On the equivalence of μ-invariant measures for the minimal process and its q-matrix. *Stochastic Process. Appl.*, 22:203–221, 1986.

[338] P.K. Pollett. On the long-term behaviour of a population that is subject to large-scale mortality or emigration. In S. Kumar, editor, *Proceedings of the 8th National Conference of the Australian Society for Operations Research*, pages 196–207, Melbourne, 1987. Australian Society for Operations Research.

[339] P.K. Pollett. On the problem of evaluating quasistationary distributions for open reaction schemes. *J. Statist. Phys.*, 53:1207–1215, 1988.

[340] P.K. Pollett. Reversibility, invariance and μ-invariance. *Adv. Appl. Probab.*, 20:600–621, 1988.

[341] P.K. Pollett. The generalized Kolmogorov criterion. *Stochastic Process. Appl.*, 33:29–44, 1989.

[342] P.K. Pollett. Diffusion approximations for a circuit switching network with random alternative routing. *Austral. Telecom. Res.*, 25:45–51, 1991.

[343] P.K. Pollett. Modelling random fluctuations in a bistable telecommunications network. In P. Hutton, editor, *Proceedings of the 11th National Conference of the Australian Society for Operations Research*, pages 11–22, HELP, 1991. Australian Society for Operations Research.

[344] P.K. Pollett. On the construction problem for single-exit Markov chains. *Bull. Austral. Math. Soc.*, 43:439–450, 1991.

[345] P.K. Pollett. Modelling random fluctuations in a bistable telecommunications network. In W. Henderson, editor, *Proceedings of the 7th Australian Teletraffic Research Seminar*, pages 335–345, Adelaide, 1992. Teletraffic Research Centre, University of Adelaide.

[346] P.K. Pollett. Analytical and computational methods for modelling the long-term behaviour of evanescent random processes. In D.J. Sutton, C.E.M. Pearce, and E.A. Cousins, editors, *Decision Sciences: Tools for Today, Proceedings of the 12th National Conference of the Australian Society for Operations Research*, pages 514–535, Adelaide, 1993. Australian Society for Operations Research.

[347] P.K. Pollett. Modelling the long-term behaviour of evanescent ecological systems. In M. McAleer, editor, *Proceedings of the International Congress on Modelling and Simulation*, volume 1, pages 157–162, Perth, 1993. Modelling and Simulation Society of Australia.

[348] P.K. Pollett. Recent advances in the theory and application of quasistationary distributions. In S. Osaki and D.N.P. Murthy, editors, *Proceedings of the Australia-Japan Workshop on Stochastic Models in Engineering, Technology and Management*, pages 477–486, Singapore, 1993. World Scientific.

[349] P.K. Pollett. The determination of quasistationary distributions directly from the transition rates of an absorbing Markov chain. *Math. Computer Modelling*, 22:279–287, 1995.

[350] P.K. Pollett. Modelling the long-term behaviour of evanescent ecological systems. *Ecological Modelling*, 86:135–139, 1996.

[351] P.K. Pollett. Limiting conditional distributions for stochastic metapopulation models. In A.D. McDonald and M. McAleer, editors, *Proceedings of the International Congress on Modelling and Simulation*, volume 2, pages 807–812, Hobart, Australia, 1997. Modelling and Simulation Society of Australia.

[352] P.K. Pollett. Modelling quasi-stationary behaviour in metapopulations. *Math. Computers Simulat.*, 48:393–405, 1999.

[353] P.K. Pollett. Quasistationarity in populations that are subject to large-scale mortality or emigration. In L. Oxley, F. Scrimgeour, and A. Jakeman, editors, *Proceedings of the International Congress on Modelling and Simulation*, volume 3, pages 667–672, Hamilton, New Zealand, 1999. Modelling and Simulation Society of Australia and New Zealand.

[354] P.K. Pollett. Quasistationary distributions for continuous time Markov chains when absorption is not certain. *J. Appl. Probab.*, 36:268–272, 1999.

[355] P.K. Pollett. Diffusion approximations for ecological models. In Fred Ghassemi, editor, *Proceedings of the International Congress on Modelling and Simulation*, volume 2, pages 843–848, Canberra, Australia, 2001. Modelling and Simulation Society of Australia and New Zealand.

[356] P.K. Pollett. Identifying Q-processes with a given finite μ-invariant measure. In Zhenting Hou, Jerzy A. Filar, and Anyue Chen, editors, *Markov processes and controlled Markov chains*, pages 41–55. Kulwer, 2001.

[357] P.K. Pollett. Quasi-stationarity in populations that are subject to large-scale mortality or emigration. *Environment International*, 27:231–236, 2001.

[358] P.K. Pollett. Ensemble behaviour in population processes with applications to ecological systems. In D. Kulasiri and L. Oxley, editors, *Proceedings of the 17th Biennial Congress on Modelling and Simulation (MODSIM07)*, pages 2903–2909, Christchurch, New Zealand, 2007. Modelling and Simulation Society of Australia and New Zealand.

[359] P.K. Pollett. Ensemble behaviour in population processes with applications to ecological systems. *Environmental Modeling & Assessment*, 14:545–553, 2008.

[360] P.K. Pollett and A.J Roberts. A description of the long-term behaviour of absorbing continuous-time Markov chains using a centre manifold. *Adv. Appl. Probab.*, 22:111–128, 1990.

[361] P.K. Pollett and D.E. Stewart. An efficient procedure for computing quasistationary distributions of Markov chains with sparse transition structure. *Adv. Appl. Probab.*, 26:68–79, 1994.

[362] P.K. Pollett and A. Vassallo. Diffusion approximations for some simple chemical reaction schemes. *Adv. Appl. Probab.*, 24:875–893, 1992.

[363] P.K. Pollett and D. Vere-Jones. A note on evanescent processes. *Austral. J. Statist.*, 34:531–536, 1992.

[364] P.K. Pollett and H.J. Zhang. Existence and uniqueness of Q-processes with a given finite μ-invariant measure. *Aust. N. Z. J. Stat.*, 46:113–120, 2004. Festschrift in honour of Daryl Daley.

[365] S.C. Port. Ratio limit theorems for Markov chains. *Pacific J. Math.*, 15:989–1017, 1965.

[366] W.E. Pruitt. Eigenvalues of non-negative matrices. *Ann. Math. Statist.*, 35:1797–1800, 1964.

[367] W.E. Pruitt. Strong ratio limit property for R-recurrent Markov chains. *Proc. Amer. Math. Soc.*, 16:196–200, 1965.

[368] K. Ramanan and O. Zeitouni. The quasi-stationary distribution for small random perturbations of certain one-dimensional maps. *Stochastic Process. Appl.*, 84:25–51, 1999.

[369] G.A. Ritter. Growth of random walks conditioned to stay positive. *Ann. Probab.*, 9:699–704, 1981.

[370] G.O. Roberts. A comparison theorem for conditioned Markov processes. *J. Appl. Probab.*, 28:74–83, 1991.

[371] G.O. Roberts and S.D. Jacka. Weak convergence of conditioned birth and death processes. *J. Appl. Probab.*, 31:90–100, 1994.

[372] G.O. Roberts, S.D. Jacka, and P.K. Pollett. Non-explosivity of limits of conditioned birth and death processes. *J. Appl. Probab.*, 34:35–45, 1997.

[373] H. Rootzén. A ratio limit theorem for the tails of weighted sums. *Ann. Probab.*, 15:728–747, 1987.

[374] P. Salminen. A ratio limit theorem for erased branching Brownian motion. *Stochastic Process. Appl.*, 41:215–222, 1992.

[375] A. Sani, D.P. Kroese, and P.K. Pollett. Stochastic models for the spread of HIV in a mobile heterosexual population. *Math. Biosci.*, 208:98–124, 2007.

[376] V.B. Scheffer. The rise and fall of a reindeer herd. *Sci. Monthly*, 73:356–362, 1951.

[377] W. Schoutens. Birth and death processes, orthogonal polynomials and limiting conditional distributions. *Math. Sci.*, 25:87–93, 2000.

[378] P. Schrijner and E.A. van Doorn. Weak convergence of conditioned birth-death processes in discrete time. *J. Appl. Probab.*, 34:46–53, 1997.

[379] E. Seneta. Quasi-stationary behaviour in the random walk with continuous time. *Austral. J. Statist.*, 8:92–98, 1966.

[380] E. Seneta. Quasi-stationary distributions and time-reversion in genetics [with discussion]. *J. Roy. Statist. Soc., Ser B*, 28:253–277, 1966.

[381] E. Seneta. Finite approximations to infinite non-negative matrices I. *Proc. Camb. Phil. Soc.*, 63:983–992, 1967.

[382] E. Seneta. Finite approximations to infinite non-negative matrices, II: refinements and applications. *Proc. Camb. Phil. Soc.*, 64:465–470, 1968.

[383] E. Seneta. *Nonnegative Matrices and Markov Chains*. Springer Series in Statistics. Springer-Verlag, New York, 2nd edition, 1981.

[384] E. Seneta and R.L. Tweedie. Moments for stationary and quasi-stationary distributions of Markov chains. *J. Appl. Probab.*, 22:148–155, 1985.

[385] E. Seneta and D. Vere-Jones. On quasi-stationary distributions in discrete-time Markov chains with a denumerable infinity of states. *J. Appl. Probab.*, 3:403–434, 1966.

[386] E. Seneta and D. Vere-Jones. On the asymptotic behaviour of subcritical branching processes with continuous state space. *Z. Wahrsch. Verw. Gebiete*, 10:212–225, 1968.

[387] R.J. Serfling. On the strong law of large numbers and related results for quasistationary sequences. *Teor. Veroyatnost. i Primenen.*, 25:190–194, 1980.

[388] L. Serlet. The occupation measure of super-Brownian motion conditioned to nonextinction. *J. Theoret. Probab.*, 9:561–578, 1996.

[389] M. Shimura. A limit theorem for two-dimensional random walk conditioned to stay in a cone. *Yokohama Math. J.*, 39:21–36, 1991.

[390] M.G. Shur. Ratio limit theorems. *Akad. Nauk Ukrain. SSR Inst. Mat. Preprint*, 26:3–13, 1987.

[391] M.G. Shur. New ratio limit theorems for Markov chains. In *Analytic methods in applied probability*, volume 207 of *Amer. Math. Soc. Transl. Ser. 2*, pages 203–212. Amer. Math. Soc., Providence, RI, 2002.

[392] M.G. Shur. On the Lin condition in strong ratio limit theorems. *Mat. Zametki*, 75:927–940, 2004.

[393] D.S. Silvestrov. Asymptotic expansions for quasi-stationary distributions of non-linearly perturbed semi-Markov processes. *Theory Stoch. Process.*, 13(1-2):267–271, 2007.

[394] D. Sirl, H. Zhang, and P. Pollett. Computable bounds for the decay parameter of a birth-death process. *J. Appl. Probab.*, 44(2):476–491, 2007.

[395] D.R. Sirl. *On the Analysis of Absorbing Markov Processes*. PhD thesis, Department of Mathematics, The University of Queensland, 2008.

[396] W. Stadje. On a uniform random walk conditioned to stay positive. *Sankhyā Ser. A*, 59:324–344, 1997.

[397] D. Steinsaltz and S.N. Evans. Markov mortality models: implications of quasistationarity and varying initial distributions. *Theoret. Pop. Biol.*, 65:319–337, 2004.

[398] D. Steinsaltz and S.N. Evans. Quasistationary distributions for one-dimensional diffusions with killing. *Trans. Amer. Math. Soc.*, 359:1285–1324 (electronic), 2007.

[399] E.R. Stirk, G. Lythe, H.A. van den Berg, G.A.D. Hurst, and C. Molina-París. The limiting conditional probability distribution in a stochastic model of T cell repertoire maintenance. *Math. Biosci.*, 224:74–86, 2010.

[400] C. Stone. Ratio limit theorems for random walks on groups. *Trans. Amer. Math. Soc.*, 125:86–100, 1966.

[401] C. Stone. On local and ratio limit theorems. In *Proc. Fifth Berkeley Sympos. Math. Statist. and Probability (Berkeley, Calif., 1965/66), Vol. II: Contributions to Probability Theory, Part 2*, pages 217–224. Univ. California Press, Berkeley, Calif., 1967.

[402] T. Strunkov. On the limiting conditional distributions for Markov chains. In *Paul Erdős and his mathematics (Budapest, 1999)*, pages 249–251. János Bolyai Math. Soc., Budapest, 1999.

[403] M.G. Šur. An analogue of the ratio limit theorem in the case of parts of a recurrent chain. *Mat. Zametki*, 27:129–136, 159, 1980.

[404] M.G. Šur. Strong ratio limit theorems. In *Probability theory and mathematical statistics (Tbilisi, 1982)*, volume 1021 of *Lecture Notes in Math.*, pages 647–654. Springer, Berlin, 1983.

[405] A. Szubarga and D. Szynal. Functional random central limit theorems for random walks conditioned to stay positive. *Probab. Math. Statist.*, 6:29–41, 1985.

[406] A. Szubarga and D. Szynal. Random limit theorems for random walks conditioned to stay positive. *Probab. Math. Statist.*, 5:83–89, 1985.

[407] A. Szubarga and D. Szynal. Random walks with random indices and negative drift conditioned to stay positive. *Probab. Math. Statist.*, 6:217–223, 1985.

[408] J.L. Teugels. Exponential ergodicity in derived Markov chains. *J. Appl. Probab.*, 5:669–678, 1968.

[409] J.L. Teugels. Exponential ergodicity in Markov renewal processes. *J. Appl. Probab.*, 5:387–400, 1968.

[410] K. Topolski. Conditioned limit theorem for virtual waiting time process of the GI/G/1 queue. *Queuing Systems Theory Appl.*, 3:377–384, 1988.

[411] A.C. Trajstman. A bounded growth population subjected to emigrations due to population pressure. *J. Appl. Probab.*, 18:571–582, 1981.

[412] P. Tuominen and R.L. Tweedie. Exponential decay and ergodicity of general Markov processes and their discrete skeletons. *Adv. Appl. Probab.*, 11:784–803, 1979.

[413] P. Tuominen and R.L. Tweedie. Exponential ergodicity in Markovian queueing and dam models. *J. Appl. Probab.*, 16:867–880, 1979.

[414] P. Tuominen and R.L. Tweedie. Subgeometric rates of convergence of f-ergodic Markov chains. *Adv. Appl. Probab.*, 26:775–798, 1994.

[415] K.F. Turkman and A.M. Walker. Limit laws for the maxima of a class of quasistationary sequences. *J. Appl. Probab.*, 20:814–821, 1983.

[416] J.W. Turner and M. Malek-Mansour. On the absorbing zero boundary problem in birth and death processes. *Physica*, 93A:517–525, 1978.

[417] R.L. Tweedie. Truncation procedures for non-negative matrices. *J. Appl. Probab.*, 8:311–320, 1971.

[418] R.L. Tweedie. The calculation of limit probabilities for denumerable Markov processes from infinitesimal properties. *J. Appl. Probab.*, 10:84–99, 1973.

[419] R.L. Tweedie. Quasi-stationary distributions for Markov chains on a general state-space. *J. Appl. Probab.*, 11:726–741, 1974.

[420] R.L. Tweedie. R-theory for Markov chains on a general state-space I: Solidarity properties and R-recurrent chains. *Ann. Probab.*, 2:840–864, 1974.

[421] R.L. Tweedie. R-theory for Markov chains on a general state-space II: r-subinvariant measures for r-transient chains. *Ann. Probab.*, 2:865–878, 1974.

[422] R.L. Tweedie. Some ergodic properties of the Feller minimal process. *Quart. J. Math. Oxford*, 25:485–495, 1974.

[423] R.L. Tweedie. Truncation approximation of the limit probabilities for denumerable semi-Markov processes. *J. Appl. Probab.*, 12:161–163, 1975.

[424] R.L. Tweedie. Criteria for ergodicity, exponential ergodicity and strong ergodicity of Markov processes. *J. Appl. Probab.*, 18:122–130, 1981.

[425] R.L. Tweedie. Truncation approximations of invariant measures for Markov chains. *J. Appl. Probab.*, 35, 1998. 517–536.

[426] E.A. van Doorn. Stochastic monotonicity of birth-death processes. *Adv. Appl. Probab.*, 12:59–80, 1980.

[427] E.A. van Doorn. Conditions for exponential ergodicity and bounds for the decay parameter of a birth-death process. *Adv. Appl. Probab.*, 17:514–530, 1985.

[428] E.A. van Doorn. The indeterminate rate problem for birth-death processes. *Pacific J. Math.*, 130:379–393, 1987.

[429] E.A. van Doorn. Quasi-stationary distributions and convergence to quasi-stationarity of birth-death processes. *Adv. Appl. Probab.*, 23:683–700, 1991.

[430] E.A. van Doorn and P.K. Pollett. Quasi-stationary distributions for reducible absorbing Markov chains in discrete time. *Markov Process. Related Fields*, 15(2):191–204, 2009.

[431] E.A. van Doorn and P.K. Pollett. Quasi-stationary distributions for discrete-state models. *European J. Oper. Res.*, 230:1–14, 2013.

[432] E.A. van Doorn and G.J.K. Regterschot. Conditional PASTA. *Operat. Res. Lett.*, 7:229–232, 1988.

[433] E.A. van Doorn and P. Schrijner. Random walk polynomials and random walk measures. *J. Comput. Appl. Math.*, 49:289–296, 1993.

[434] E.A. van Doorn and P. Schrijner. Geometric ergodicity and quasi-stationary distributions in discrete-time birth-death processes. *J. Austral. Math. Soc. Ser. B*, 37:121–144, 1995.

[435] E.A. van Doorn and P. Schrijner. Ratio limits and limiting conditional distributions for discrete-time birth-death processes. *J. Math. Anal. Appl.*, 190:263–284, 1995.

[436] E.A. van Doorn and P. Schrijner. Limit theorems for discrete-time Markov chains on the nonnegative integers conditioned on recurrence to zero. *Stochastic Models*, 14:77–102, 1996.

[437] E.A. van Doorn and P. Schrijner. Orthogonal polynomials and Markov chains. *General Seminar of Mathematics (Department of Mathematics, University of Patras, Greece*, 18–21:67–76, 1996.

[438] Erik A. van Doorn. Conditions for the existence of quasi-stationary distributions for birth-death processes with killing. *Stochastic Process. Appl.*, 122:2400–2410, 2012.

[439] V. Vatutin and E. Dyakonova. Yaglom type limit theorem for branching processes in random environment. In *Mathematics and computer science. III*, Trends Math., pages 375–385. Birkhäuser, Basel, 2004.

[440] D. Vere-Jones. Geometric ergodicity in denumerable Markov chains. *Quart. J. Math. Oxford*, 13:7–28, 1962.

[441] D. Vere-Jones. Ergodic properties of non-negative matrices, I. *Pacific J. Math.*, 22:361–386, 1967.

[442] D. Vere-Jones. Ergodic properties of non-negative matrices, II. *Pacific J. Math.*, 26:601–620, 1968.

[443] D. Vere-Jones. Some limit theorems for evanescent processes. *Austral. J. Statist.*, 11:67–78, 1969.

[444] Denis Villemonais. Interacting particle systems and Yaglom limit approximation of diffusions with unbounded drift. *Electron. J. Probab.*, 16:no. 61, 1663–1692, 2011.

[445] D.M. Walker. The expected time until absorption when absorption is not certain. *J. Appl. Probab.*, 35:812–823, 1998.

[446] D.M. Walker. *μ-Invariant Vectors and Measures for Continuous Time Markov Chains*. PhD thesis, Department of Mathematics, The University of Queensland, 1998.

[447] X.B. Wang and X.M. Wang. Limit laws for the extreme values of a class of quasi-stationary sequences. *Acta Math. Appl. Sinica*, 18:364–372, 1995.

[448] W.A.O'N. Waugh. Conditioned Markov processes. *Biometrika*, 45:241–249, 1958.

[449] S. Wright. Evolution in mendelian populations. *Genetics*, 16:97–159, 1931.

[450] Q.Y. Wu. μ-invariant vectors for Q-processes. *Math. Appl. (Wuhan)*, 14(suppl.):57–61, 2001.

[451] Q.Y. Wu. μ-invariant measures for Q-processes. *Chinese J. Appl. Probab. Statist.*, 19:394–400, 2003.

[452] Q.Y. Wu. μ-invariant measures for Q-processes—the case containing an absorbing state. *Acta Math. Sci. Ser. A Chin. Ed.*, 24:16–25, 2004.

[453] A.M. Yaglom. Certain limit theorems of the theory of branching processes (in Russian). *Dokl. Acad. Nauk SSSR*, 56:795–798, 1947.

[454] J. Ye. Quasi-stationary distributions for the radial Ornstein-Uhlenbeck processes. *Acta Math. Sci. Ser. B Engl. Ed.*, 28(3):513–522, 2008.

[455] P.L. Yong. Some results related to q-bounded Markov processes. *Nanta Math.*, 8:34–41, 1975.

[456] H. Zhang and W. Liu. Domain of attraction of the quasi-stationary distribution for the linear birth and death process. *J. Math. Anal. Appl.*, 385:677–682, 2012.

[457] H. Zhang and Y. Zhu. Domain of attraction of the quasi-stationary distribution for the linear birth and death process with killing. *Chinese J. Appl. Probab. Statist.*, 29:561–569, 2013.

[458] J.F. Zhang, S.M. Li, and R.M. Song. Quasi-stationarity and quasi-ergodicity of general Markov processes. *Sci. China Math.*, 57:2013–2024, 2014.

[459] M. Zhao and M. Jin. Invariant measure, ratio limits and Martin boundary. *Appl. Math. J. Chinese Univ. Ser. B*, 17:465–472, 2002.

[460] M. Zhao and J. Ying. Ratio limit theorems for random walks and Lévy processes. *Potential Anal.*, 23:357–380, 2005.

[461] I.B. Ziedins. Quasi-stationary distributions and one-dimensional circuit-switched networks. *J. Appl. Probab.*, 24:965–977, 1987.

[462] V.M. Zolotarev. More exact statements of several theorems in the theory of branching processes. *Teor. Veroyatnost. i Primenen.*, 2:256–266, 1957.

[463] T.M. Zuparov and K.B. Mamadaliev. The strong law of large numbers for quasistationary sequences in Hilbert space. *Izv. Akad. Nauk UzSSR Ser. Fiz.-Mat. Nauk*, 1:15–19, 81, 1982.